DOCUMENT RESUME

ED 319 999	CE 055 042

TITLE	Seventh Report to the President and Congress on the Status of Health Personnel in the United States.
INSTITUTION	Health Resources and Services Administration (DHHS/PHS), Rockville, MD. Bureau of Health Professions.
REPORT NO	DHHS-HRS-P-OD-90-1
PUB DATE	Mar 90
NOTE	421p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC17 Plus Postage.
DESCRIPTORS	Adults; Allied Health Occupations Education; Dental Hygienists; Dental Schools; Dental Students; Dentists; *Employment Projections; *Health Occupations; *Labor Needs; Labor Supply; *Medical Education; Medical Schools; Medical Services; Nurses; Nursing Education; *Occupational Information; Optometrists; Pharmaceutical Education; Pharmacists; Physicians; Physicians Assistants; Podiatry; Postsecondary Education; Public Health; Veterinarians
IDENTIFIERS	Chiropractors

ABSTRACT

This document provides selected information on characteristics of health personnel disciplines, students preparing for these disciplines, their schools, projections of the personnel supply in each discipline to the year 2020, and discussions of whether the U.S. requirements for health personnel are likely to be met. Following an introduction, chapter 2 provides an overview of major personnel developments, including trends in education and training, the current supply of health care personnel, issues affecting health personnel, and health personnel in the coming years. Current and emerging health issues and personnel issues are covered in chapters 3 and 4. Among the health issues covered are an aging population, infant mortality, human immune deficiency virus, acquired immunodeficiency syndrome, substance abuse, access to health care, a changing health delivery system, and quality assurance and effectiveness in medical practice. The personnel issues addressed include declining applicants and enrollments, the shortage of nurses, primary health care concerns, concerns regarding allied health and public health labor supply, personnel for health care in geriatrics, and underrepresented minorities in the health professions. Chapter 5 discusses the data and methodology used to produce this report. The next 11 chapters provide information on physicians, dental personnel, nursing personnel, public health personnel, allied health personnel, optometrists, pharmacists, podiatrists, veterinarians, chiropractors, and physician assistants. The document contains reference lists that follow each chapter, 95 tables, and 75 figures. (CML)

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SEVENTH REPORT TO THE PRESIDENT AND CONGRESS

ON THE STATUS OF HEALTH PERSONNEL

IN THE UNITED STATES

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- Tracking the supply of health professionals and monitoring their competence through operation of a nationwide data bank on malpractice claims and sanctions; and
- Monitoring developments affecting health facilities, especially those in rural areas.

SEVENTH REPORT TO THE PRESIDENT AND CONGRESS

ON THE STATUS OF HEALTH PERSONNEL

IN THE UNITED STATES

March 1990

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Health Resources and Services Administration
Bureau of Health Professions

DHHS Publication No. HRS-P-OD-90-1

PREFACE

This Report to the President and Congress on the Status of Health Personnel in the United States is the seventh biennial report on the Nation's health care personnel. It is submitted by the Secretary of Health and Human Services to the President and Congress in compliance with a number of legislative authorities. The Report provides information on physicians, physician assistants, dental personnel, pharmacists, optometrists, podiatrists, veterinarians, nursing personnel, public health personnel, allied health personnel, and chiropractors. This information should be of value in understanding major personnel changes that are now occurring and that may affect the Nation's health care delivery system in the future.

As in previous reports, the present report provides selected information on characteristics of these health personnel disciplines and on students preparing for these disciplines and their schools. It includes projections of personnel supply to the year 2020, by discipline, and discusses whether the Nation's requirements for health personnel are likely to be met.

While the total number of health providers has continued to increase throughout the 1980s, a variety of health and health personnel issues have surfaced that are having a significant effect on the Nation's health care delivery system, including major changes in the structure and financing of medical care. Among these issues are demographic developments, especially the growing population over age 65 that requires personnel with geriatrics training, the growing AIDS incidence, the wide-spread substance abuse problem, the nursing shortage, declines in health professions applicants and enrollments, and the persistent underrepresentation of minorities among health personnel.

These and other important developments and issues and their implications for health personnel are discussed in three new chapters (Nos. III-V). Individual health professions mentioned earlier are discussed in detail in separate chapters (Nos. VI-XVI).

The Report was prepared in the Bureau of Health Professions, Health Resources and Services Administration, Robert G. Harmon, M.D., M.P.H., Administrator, Assistant Surgeon General. It was planned, coordinated, and compiled by the Bureau's Office of Data Analysis and Management, Howard V. Stambler, Director. Principal contributions were made by the Division of Associated and Dental Health Professions, the Division of Disadvantaged Assistance, the Division of Medicine, the Division of Nursing, and the Division of Quality Assurance and Liability Management. Other offices and agencies of the Department also have provided contributions and assistance.

CONTENTS

Page

Preface.......... iii

List of Tables.......... ix

List of Figures.......... xvii

Chapter I Introduction.......... I-1

Chapter II An Overview of Major Personnel Developments.......... II-1

- Trends in Education and Training.......... II-1
- Current Supply of Health Care Personnel.......... II-5
- Issues Affecting Health Personnel.......... II-7
- Health Personnel in the Coming Years.......... II-8

Chapter III Current and Emerging Health Issues.......... III-A-1

- Introduction.......... III-A-1
- Aging Population.......... III-B-1
- Infant Mortality.......... III-C-1
- Human Immune Deficiency Virus (HIV)/Acquired Immunodeficiency Syndrome (AIDS).......... III-D-1
- Substance Abuse.......... III-E-1
- Access to Health Care: Issues and Concerns.......... III-F-1
- Changing Delivery System.......... III-G-1
- Quality Assurance and Medical Effectiveness in Medical Practice: Issues and Educational Needs.......... III-H-1

Chapter IV Current and Emerging Personnel Issues.......... IV-A-1

- Introduction.......... IV-A-1
- Declining Applicants and Enrollments.......... IV-B-1
- Nursing Shortage.......... IV-C-1
- Primary Care Concerns.......... IV-D-1
- Allied Health Manpower Concerns.......... IV-E-1
- Public Health Manpower Concerns.......... IV-F-1
- Personnel for Health Care in Geriatrics.......... IV-G-1
- Underrepresented Minorities in the Health Professions.......... IV-H-1

Chapter V Health Professions Data and Methodology.......... V-1

- Introduction.......... V-1
- Data Availability.......... V-1
- Analytical Methodologies and Projections.......... V-4
- Next Steps.......... V-6

CONTENTS (Continued)

Page

Chapter VI Medicine--Allopathic and Osteopathic................. VI-1

Developments in Supply................................ VI-1
Allopathic Physician Supply........................... VI-1
Foreign Medical Graduates............................. VI-3
Gender and Ethnicity of Allopathic Physicians........ VI-3
Characteristics of Allopathic Practice............... VI-5
Quality Assurance..................................... VI-6
Managed Care.. VI-7
Geographic Distribution of Allopathic Physicians..... VI-8
Programs to Improved Access to Care................. VI-9
Osteopathic Physician Supply......................... VI-11
Developments in Education............................ VI-11
Undergraduate Allopathic Medical Education........... VI-11
Undergraduate Osteopathic Medical Education.......... VI-14
Graduate Allopathic Medical Education................ VI-15
Osteopathic Graduate Medical Education............... VI-16
National Resident Matching Program (NRMP)............ VI-17
FMGs in Graduate Medical Education................... VI-17
Financing of Graduate Medical Education.............. VI-18
A Look at the Future................................. VI-19
Physician Supply Forecasts........................... VI-21
Physician Requirements Forecasts..................... VI-23
Future Adequacy of Physician Supply.................. VI-25
References... VI-29
Appendix Tables...................................... VI-34

Chapter VII Dentistry.. VII-1

Developments in Health Personnel Supply.............. VII-1
Characteristics of Private Dental Practice........... VII-4
Dental Education..................................... VII-5
Future of Dental Manpower............................ VII-7
Dental Manpower Requirements......................... VII-11
Economic Outlook for and Employment of Dental
Manpower, 1988-2000.................................. VII-12
Summary.. VII-15
Auxiliaries.. VII-16
References... VII-20
Technical Note VII-1................................. VII-24
Technical Note VII-2................................. VII-25
Appendix Tables...................................... VII-26

CONTENTS (Continued)

Page

Chapter VIII Nursing.. VIII-1

Current Developments in Nursing Education........... VIII-2
Current Developments in the Registered Nurse Population.................................. VIII-8
Rates of Compensation................................ VIII-22
The Outlook for the Future.......................... VIII-24
Conclusions and Recommendations..................... VIII-40
References... VIII-42
Appendix Tables...................................... VIII-45

Chapter IX Public Health.................................... IX-1

Introduction... IX-1
Supply of Public Health Professionals............... IX-3
Educational Developments............................ IX-7
Public Health Personnel Problems.................... IX-10
Conclusions and Recommendations..................... IX-12
References... IX-13

Chapter X Allied Health..................................... X-1

Introduction... X-1
Clinical Laboratory Personnel....................... X-4
Physical Therapy..................................... X-6
Occupational Therapy................................. X-8
Dietetic Services.................................... X-10
Medical Records Personnel........................... X-11
Radiologic Services.................................. X-13
Speech-Language Pathology and Audiology............. X-15
Respiratory Therapy Personnel....................... X-16
Other Disciplines.................................... X-18
Clinical Psychologists............................... X-18
Area Health Education Centers....................... X-20
Status Report on Development of Allied Health Reporting System.................................... X-21
References... X-22

Chapter XI Optometry....................................... XI-1
Introduction... XI-1
Educational Developments............................ XI-2
A Look Ahead... XI-5
Requirements for Future Practitioners............... XI-8
References... XI-9
Appendix Tables...................................... XI-10

CONTENTS (Continued)

Page

Chapter XII Pharmacy XII-1

Introduction XII-1
Developments in Supply XII-1
Educational Trends and Developments XII-4
Postgraduate Training and Pharmacy Specialties XII-7
Projections of Future Supply XII-9
Current and Future Trends in Pharmacy XII-12
Other Trends in Pharmacy Practice XII-16
References XII-19
Appendix Tables XII-21

Chapter XIII Podiatric Medicine XIII-1

Introduction XIII-1
Number and Characteristics of Podiatrists XIII-1
Developments in the Licensure of Podiatrists XIII-3
A Look into the Future XIII-11
References XIII-13
Appendix Tables XIII-14

Chapter XIV Veterinary Medicine XIV-1

Introduction XIV-1
Developments in Supply XIV-1
Student Trends and Developments XIV-3
Projections of Future Supply XIV-5
References XIV-9
Appendix Tables XIV-10

Chapter XV Chiropractic XV-1

Introduction XV-1
Chiropractic Education XV-5
Supply of Chiropractors XV-5
Characteristics of Chiropractors XV-5
Projections of Future Supply XV-8
References XV-10
Appendix Tables XV-11

Chapter XVI Physician Assistants XVI-1

Introduction XVI-1
Practice Characteristics of Physician Assistants XVI-1
Developments in PA Educational Programs XVI-6
A Look at the Future XVI-10
References XVI-13
Appendix Tables XVI-16

LIST OF TABLES

Table Page

Chapter III: Current and Emerging Health Issues

III-C-1 Infant Mortality Rates, Selected Counties, Mid-1980s III-C-2

III-F-1 Shortage Areas 1984-1988 .... III-F-7

III-G-1 Health Care Facilities and Organizations in the United States, 1987 .... III-G-3

Chapter IV: Current and Emerging Health Issues

IV-B-1 Applicants to Health Profession Schools by Discipline IV-B-1

IV-B-2 First-Year Enrollments to Health Profession Schools by Discipline IV-B-2

IV-F-1 Environmental Health Professional Providing Public Health Services, 1987 .... IV-F-2

IV-H-A-1 Employed Civilians in Selected Health Occupations and Percent Black and Hispanic, 1987 .... IV-H-8

IV-H-A-2 Total Enrollments in Selected Health Professions Schools/Programs by Racial/Ethnic Minority Groups 1980-81 to 1987-88 .... IV-H-9

IV-H-A-3 Graduates from Selected Health Professions Schools/Programs by Racial/Ethnic Minority Groups 1979-80 to 1987-88 .... IV-H-10

Chapter VI: Medicine--Allopathic and Osteopathic

VI-1 Number of Yearly New Entrants and Losses VI-20

VI-A-1 The Supply of Physicians (MDs) in the U.S.: Selected Years, 1963-1986 .... VI-34

VI-A-2 Major Professional Activity of Federal and Non-Federal Physicians (MDs): Selected Years, 1970-1986 .... VI-35

VI-A-3 Number of FMGs in Residency and Percent FMGs in Top Eleven Ranked States, September 1, 1987 .... VI-36

LIST OF TABLES

Table		Page
VI-A-4	Number of NonFederal Physicians and Physicians Per 100,000 Civilian Population, by States...........	VI-37
VI-A-5	Applicants to U.S. Medical Schools, by Gender: Selected Entering Years 1968-1988.....................	VI-38
VI-A-6	Number and Percent of Accepted Applicants to U.S. Medical Schools and Applicant Acceptance Ratio, by Gender: Selected Entering Years 1968-1988........	VI-39
VI-A-7	First-Year Enrollment, Total Enrollment, and Graduates of U.S. Medical Schools, by Gender: Selected Years 1968-1988..............................	VI-40
VI-A-8	First-Year Enrollment in U.S. Medical Schools, by Ethnic Group: Selected Entering Years 1980-1988......	VI-41
VI-A-9	Applicants, First-Year Enrollment, Total Enrollment, and Graduates in U.S. Schools of Osteopathic Medicine, by Gender: Selected Entering Years 1968-1988..............................	VI-42
VI-A-10	First-Year Enrollment in U.S. Schools of Osteopathic Medicine, by Ethnic Group: Selected Entering Years 1980-1988.....................	VI-43
VI-A-11	First-Year Enrollments and Graduates of Allopathic and Osteopathic Medical Schools: 1981-1982 Through 2019-2020...........................	VI-44
VI-A-12	Supply of Active Physicians (MD and DO) by Country of Medical Education Estimated for Base Year 1986, and Projected Basic Series, 1987-2020..........	VI-45
VI-A-13	Supply of Physicians (MD and DO) by Gender: Estimated 1980 and 1986 Projected Using the Basic Methodology, 1990, 2000, and 2020.....................	VI-46
VI-A-14	Number of Active Physicians (MDs) by Specialty and Percent Change, Projected 1986, 2000 and 2020........	VI-47
VI-A-15	Number of Active Physicians (MDs) by Geographic Region, Division, and State and Percent Change Estimated 1986 and Projected 1990 and 2000...........	VI-48
VI-A-16	Ratio of Active Physicians (MDs) Per 100,000 Population by Geographic Region, Division, and State and Percent Change Estimated 1986 and Projected 1990 and 2000..............................	VI-50

Table Page

VI-A-17 Comparison of Supply and Requirements for Physicians (MDs and DOs): 1986 Supply and Projections to 1990 and 2000.......................... VI-52

Chapter VII: Dentistry

VII-1 Dental School Applicants and Enrollees, 1986 and 1987... VII-5

VII-2 Dental Applicants by Ethnic Group, 1986 and 1987..... VII-6

VII-3 Dental Enrollees by Ethnic Group, 1986 and 1987...... VII-6

VII-4 Actual and Forecast Percent Growth, Total and Per Capita Real Dental Care Expenditures, 1965-2005...... VII-14

VII-5 Location of Dental Hygiene Entry Level Programs...... VII-17

VII-A-1 Number Dental School Applicants in Relation to Number of First-Year Dental Students: Academic Years 1960-61 through 1988-89....................... VII-26

VII-A-2 First-Year Enrollment in Schools by Dentistry in the United States, by Sex: Academic Years 1968-69 through 1988-89... VII-27

VII-A-3 Graduates of Schools of Dentistry in the United States, by Sex: Academic Years 1971-72 through 1987-88.. VII-28

VII-A-4 Number of First-Year Dental Students and Number of Dental Graduates, by Sex: Projected for Academic Years 1987-88 through 2019-20............... VII-29

VII-A-5 Number of Active Dentists and Dentist-to-Population Ratios: Selected Years, Estimate 1970-88, and Projected 1990-2020................................. VII-30

VII-A-6 Number of Active Dentists by Sex: Estimated 1988, and Projected for Selected Years 1988-2020........... VII-31

VII-A-7 Forecast of Economic Activity in the Dental Sector Based on Department of Commerce Data, 1988-2000..... VII-32

Chapter VIII: Nursing

Table		Page
VIII-1	Distribution of Registered Nurse Population by Employment Status, March 1988	VIII-8
VIII-2	Employment Rate of Registered Nurse Population, 1977-1988	VIII-8
VIII-3	Distribution of Registered Nurse Population by Racial/Ethnic Background and Employment Status, March 1988	VIII-9
VIII-4	Distribution of Registered Nurse Population by Type of Basic Nursing Education, 1977-1988	VIII-11
VIII-5	Registered Nurses with Advanced Education at the Master's or Doctoral Level by Primary Focus of Degree, March 1988	VIII-12
VIII-6	Percent Distribution of Registered Nurse Population by Region and Employment Status, March 1988	VIII-13
VIII-7	Average Annual Salary for Newly Licensed Nurses Employed on A Full-Time Basis, by Region: July 1987	VIII-22
VIII-8	Projected Number of Graduates from Basic Nursing Programs Preparing Registered Nurses, by Type of Program: Academic Years 1990 Through 2020	VIII-25
VIII-9	Registered Nurse Population, Supply and FTE Supply: 1990-2020	VIII-27
VIII-10	Activity Rate of Registered Nurses by Age Group, and Percent of Population Over 50: 1990-2020	VIII-27
VIII-11	Projections of Total Registered Nurse Supply and Full-Time Equivalent Supply Ratios: 1990-2020	VIII-28
VIII-12	Highest Educational Preparation of Registered Nurse Supply: 1990-2020	VIII-28
VIII-13	Projected Requirements for Full-Time Equivalent Registered Nurses from the Historical Trend-Based Model, by Area of Practice: 1990-2020	VIII-33
VIII-14	Projected Requirements for Full-Time Equivalent Nursing Personnel from the Criteria-Based Model, by Area of Practice: for 2000	VIII-36

Table		Page
VIII-15	Comparison of FTE RN Requirements from the Historical Trend-Based Model and Criteria-Based Model: for 2000	VIII-38
VIII-A-1	Admissions to and Graduations from Nursing Educational Programs Preparing Registered Nurses, by Type of Program and Geographic Area, 1987-1988	VIII-45
VIII-A-2	Admissions to and Graduations from Practical Nursing Educational Programs by Geographic Area: 1986-1987	VIII-46
VIII-A-3	Registered Nurse Population and Full-Time Equivalent Employed Registered Nurses by Geographic Area, March 1988	VIII-47
VIII-A-4	Projected Supply of Registered Nurses by Educational Preparation and Geographic Area, December 31, 2000	VIII-48
VIII-A-5	Projected Full-Time Equivalent Supply of Registered Nurses by Educational Preparation and geographic Area, December 31, 2000	VIII-49
VIII-A-6	Projected Requirements for Full-Time Equivalent Registered Nurses from Historical Trend-Based Model, 2000	VIII-50
VIII-A-7	Projected Requirements for Full-Time Equivalent Registered Nurses from Criteria-Based Model, by Geographic Area and Educational Preparation, 2000	VIII-51
VIII-A-8	Projected Requirements for Full-Time-Equivalent Registered Nurses from Criteria-Based model, by Geographic Area and Educational Preparation, 2000	VIII-52
VIII-A-9	Projected Requirements for Full-Time Equivalent Licensed Practical/Vocational Nurses and Nursing Aides, from Criteria-Based Model, 2000	VIII-53

Table Page

Chapter IX: Public Health

IX-1 Supply of Public Health Professionals, 1989.......... IX-3

IX-2 Environmental Health Professions, 1987............... IX-4

IX-3 Needs for Environmental Health Professionals, 1987... IX-5

Chapter X: Allied Health

X-1 Number of Medical Laboratory Programs and Graduates: 1982 through 1988.................................... X-6

X-2 Number of Respiratory Therapy Programs and Graduates: 1982 through 1988......................... X-18

Chapter XI: Optometry

XI-A-1 Number of Active Optometrists and Optometrist-to-Population Ratios: Selected Years, Estimated 1970-1988, and Projected 1990-2020......... XI-10

XI-A-2 Number of Active Optometrists, by Sex: Estimated 1988, and Projected for Selected Years, 1990-2020.... XI-11

Chapter XII: Pharmacy

XII-1 Number of Active Pharmacists and Pharmacists-to-Population Ratios: Selected Years, Estimated 1970-1988, and Projected 1990-2020......... XII-9

XII-2 Estimated Full-Time Equivalent Supply of Pharmacists.. XII-10

XII-A-1 Number of Active Pharmacists and Pharmacists-to-Population Ratios: Selected Years, Estimated 1970-1988, and Projected 1990-2020......... XII-21

XII-A-2 Number of Active Pharmacists, by Sex: Estimated 1988, and Projected for Selected Years, 1988-2020.... XII-22

XII-A-3 Third-to-Last Year Enrollment in Schools of Pharmacy in the United States, by Sex: Academic Years 1969-70 Through 1987-88....................... XII-23

Table — Page

Chapter XIII: Podiatric Medicine

XIII-1 Estimated Number of Podiatrists in the United States in 1970, 1975, 1983, 1986 and 1988..... XIII-2

XIII-2 Faculty in Colleges of Podiatric Medicine, Academic Years 1986-87, 1987-88, 1988-89............. XIII-6

XIII-3 Podiatric Residencies Program Category and Length of training, Number of Programs and First-Year Residency Positions in 1988......................... XIII-9

XIII-4 Number and Percentage of Women and Minorities Graduated from Colleges of Podiatric Medicine, Academic Years 1982-83 through 1987-88............... XIII-10

XIII-A-1 Colleges of Podiatric Medicine, Number of Students in Academic Years 1986-87, 1987-88, 1988-89.. XIII-14

XIII-A-2 College-Administered Student Assistance Data, Academic Years 1982-83 through 1988-88............... XIII-15

Chapter XIV: Veterinary Medicine

XIV-A-1 Number of Active Veterinarians and Veterinarians-to-Population Ratios: Selected Years, Estimated 1970-1988, and Projected 1990-2020................... XIV-10

XIV-A-2 Number and Percent Distribution of Active Veterinarians, by Type of Employment, and by Sex: December 31, 1988.................................. XIV-11

XIV-A-3 Number and Percent Distribution of Active Veterinarians, by Professional Activity, and by Sex: December 31, 1988........................... XIV-12

XIV-A-4 Number of Active Veterinarians, by Sex: Estimated 1988, and Projected for Selected Years 1990-2020..... XIV-13

Chapter XV: Chiropractic

XV-A-1 Colleges of Chiropractic in the United States: Location, Accreditation, and Graduates, 1981 and 1988... XV-11

Table | Page

XV-A-2 Estimated Numbers and Ratios of Active Chiropractors-to-Population: United States, 1987-1988... XV-12

XV-A-3 Number of Active Chiropractors, by Sex: United States, 1978-1988............................. XV-13

XV-A-4 Estimated and Projected Number of Active Chiropractors and Chiropractors-to-Population Ratios: 1980-2020................................... XV-14

Chapter XVII: Physician Assistants

XVI-1 PA Employment Opportunities by Setting............... XVI-5

XVI-A-1 Distribution of Physician Assistants by Specialty 1984-88.................................. XVI-16

XVI-A-2 Trends in the Ethnic Representation of Physician Assistant Students Enrolled in Physician Assistant Programs from 1983 through 1988...................... XVI-17

XVI-A-3 Number and Attrition Rates of the 1987 Graduating Class by Ethnicity.................................. XVI-18

XVI-A-4 Number and Attrition Rates of the 1988 Graduating Class by Ethnicity.................................. XVI-19

XVI-A-5 Health Resources and Services Administration Support for Physician Assistant Programs, Fiscal Years 1972-1988.............................. XVI-20

LIST OF FIGURES

Figure Page

Chapter II: An Overview of Major Personnel Developments

II-1 Applicants to Schools of Allopathic and Osteopathic Medicine and Dentistry Selected Years: 1976 to 1988 .... II-1

II-2 Average Annual Percentage Change in First-Year Enrollments in Selected Health Professions II-2

II-3 First-Year Enrollments and Graduates in Registered Nurses Training Programs Selected Years: 1970-1988 .... II-2

II-4 Percent of Female First Year Enrollment in Selected Health Professions II-3

II-5 Growth in Female Practitioners in Medicine and Dentistry II-3

II-6 Minority Enrollment in Health Professions Schools for Selected Years II-4

II-7 Number of Graduates of Selected Health Professions Education Programs II-4

II-8 Active Health Personnel Selected Years: 1970 to 1988 .... II-5

II-9 Population Ratios of Health Personnel Selected Years: 1970 to 1988 .... II-5

II-10 Percent of Hispanics and Blacks Employed in Selected Allied Health Fields, 1983-88 .... II-6

II-11 Percent Changes in Total Population and in Population of Persons Age 65 and Over Projected to Year 2025 .... II-7

II-12 Percentage of Persons Aged 65 and Over in Selected Age Groups 1965 to 2020 .... II-7

Chapter III: Current and Emerging Health Issues

III-B-1 Growth of the Older Population 1900-1986 .... III-B-2

III-G-1 Growth in Health Care Expenditures for Years 1950-1987 .... III-G-1

Figure **Page**

III-G-2 Distribution of National Health Care Expenditures, 1987.......... III-G-2

Chapter IV: Current and Emerging Personnel Issues

IV-C-1 Registered Nurse Population by Nursing Employment Status.......... IV-C-3

IV-H-I Total and Underrepresented Minority Enrollments in Selected Health Professions Schools.......... IV-H-3

Chapter VI: Medicine--Allopathic and Osteopathic

VI-1 Total Number of Physicians (MD) and Physicians Per 100,000 Population Ratio for Selected Years.......... VI-2

VI-2 Percent Distribution of Professionally Active MDs in Primary Care, 1970-1986.......... VI-2

VI-3 Geographic Distribution of DOs by U.S. Census Regions - 1987.......... VI-11

VI-4 Number and Percent of Underrepresented Minority Applicants to U.S. Allopathic Medicine Schools: 1980-1988.......... VI-12

VI-5 Medical School Acceptance Rates 1975-1986.......... VI-13

VI-6 First-Year Enrollment in U.S. Schools of Osteopathic Medicine for Selected Ethnic Groups, 1980-1988.......... VI-14

Chapter VII: Dentistry

VII-1 Active Dentists Per 100,000 Population: 1950-1988.......... VII-2

VII-2 Dental Specialist to Population Ratios: Selected Years 1970, 1980, and 1987.......... VII-2

VII-3 Number of Active Dentists by Sex: Estimated 1988 and Projected for Selected Years: 1990-2020.......... VII-3

VII-4 Trends in Applicants and First-Year Enrollments in Dental Schools: 1978-88.......... VII-8

VII-5 Active Dental Assistants Per 100 Active Dentists for Selected Years.......... VII-18

VII-6 Active Dental Laboratory Technicians Per 100 Active Dentists.......... VII-19

Figure **Page**

Chapter VIII: Nursing

VIII-1 Admissions to Basic RN Nursing Education Programs Academic Years 1980-1988...................... VIII-4

VIII-2 Enrollments in Basic RN Nursing Education Programs As of October 1, 1980-1988.................... VIII-4

VIII-3 Graduations from Basic Nursing Educational Programs: Academic Years Ending 1980-1988............. VIII-4

VIII-4 Age Distribution of RN Population, 1984 and 1988....... VIII-10

VIII-5 Highest Educational Preparation of Registered Nurses.................................... VIII-11

VIII-6 Employed RNs Per 100,000 Population, March 1988........ VIII-14

VIII-7 Percent Increase of Total Employed Registered Nurses, 1977 to 1988................................ VIII-15

VIII-8 Field of Employment of Registered Nurses, March 1988.. VIII-16

VIII-9 FTE Nursing Personnel in Community Hospitals, 1982 and 1987.. VIII-16

VIII-10 Position Titles in Primary Positions for Registered Nurses Employed in Nursing: March 1988..... VIII-20

VIII-11 Ranking of Average Annual Salaries of 1985-86 Bachelor's Degree Recipients by Major Field of Study: 1987.. VIII-22

VIII-12 Average Annual Earnings of Staff Nurses Employed Full Time by Field of Employment: November 1984 and March 1988........................... VIII-23

VIII-13 New Licensees vs Total Loss in Licensees for Registered Nurses: 1990-2020...................... VIII-26

VIII-14 Percent Change in Registered Nurse Supply by State from 1990 to 2020............................... VIII-30

VIII-15 Percentage Change in FTE Registered Nurse Requirements by State from 1990 to 2020................ VIII-34

VIII-16 Comparison of the Nurse Supply and Historical Trend-Based Requirements for Full-Time Equivalent RNs: 1990-2020............................. VIII-39

Figure		Page
VIII-17	Highest Educational Preparation of Full-Time Equivalent RNs from the Criteria-Based and Nurse Supply Models for 2000	VIII-39

Chapter X: Allied Health

X-1	Estimated Number of Allied Health Personnel: United States 1970-88	X-2
X-2	Number of Graduates of Medical Records Training Programs: 1982-88	X-13
X-3	Number of Graduates in Radiologic Training Programs: 1982-1988	X-14

Chapter.XI: Optometry

XI-1	Number of Active Optometrists in U.S. Estimated to 1988 and Projected to 2020	XI-6
XI-2	Number of Active Optometrists by Sex Estimated 1988 and Projected 1990-2020	XI-6

Chapter XII: Pharmacy

XII-1	Estimated Percent Women Active Pharmacists	XII-2
XII-2	Estimated Percent Minority Active Pharmacists	XII-3
XII-3	Third-to-Last Year Enrollment in Schools and Colleges of Pharmacy	XII-5
XII-4	Percent Women Enrolled in Third-to-Last Year Program	XII-5
XII-5	Number of Entry-Level Graduates from Schools of Pharmacy	XII-6
XII-6	Number of Women Graduates from Schools of Pharmacy	XII-6
XII-7	Projected Number of Male and Female Active Pharmacists	XII-10

Figure **Page**

Chapter XIII: Podiatric Medicine

XIII-1 Percent of Podiatric Medicine Graduates Remaining in Area of Education........................ XIII-3

XIII-2 Colleges of Podiatric Medicine, Number of Colleges and First-Year Students 1960-1988............. XIII-5

XIII-3 Enrollment of Women in Colleges of Podiatric Medicine... XIII-6

XIII-4 Enrollment of Minorities in Colleges of Podiatric Medicine.................................... XIII-6

XIII-5 Guaranteed Student Loans (GSL) and Health Education Assistance Loans (HEAL) Funds Administered in Academic Years 1982-83 through 1987-88.. XIII-8

XIII-6 First-Year Podiatric Residencies Relative to Graduates, 1982-1988................................ XIII-9

XIII-7 Forecast Supply of Podiatrists by Sex 1985 to 2020.. XIII-11

Chapter XIV: Veterinary Medicine

XIV-1 Number of Active Veterinarians by Sex Estimated 1988 and Projected 1990-2020........................... XIV-1

XIV-2 Total Number of Active Veterinarians 1970-88 and Projected 1990-2020................................ XIV-6

Chapter XV: Chiropractic

XV-1 Annual Number of Pediatric and Geriatric Cases Seen by Chiropractors........................... XV-8

Chapter XVI: Physician Assistants

XVI-1 Distribution of Physician Assistants Respondents by Geographic Region, 1984................. XVI-1

XVI-2 Distribution of Physician Assistants Respondents by Size of Community, 1984................. XVI-3

XVI-3 Salary Ranges for Civilian PAs.... .... XVI-5

Figure		Page
XVI-4	Estimated Total Physician Assistant Students Enrollment, 1984-1989	XVI-6
XVI-5	Trends in Physician Assistant Students Expenses, 1984-1989	XVI-8
XVI-6	Sources of Financial Support for Physician Assistant Educational Programs, 1984-1989	XVI-9

Chapter 1

INTRODUCTION

Legislation enacted in the 1970s requires the periodic submission of reports by the Secretary of the Department of Health and Human Services to the President and Congress on the status of health professions personnel supply and distribution, and on the numbers required to provide adequate health care for the Nation.

The seventh in a series of reports required by Section 708(d)(1) of the Public Health Service Act, as amended by P.L. 94-484 and further amended by P.L. 95-623, P.L. 100-607 and P.L. 100-690, this report presents information on personnel in the professions of medicine (allopathic and osteopathic), dentistry, optometry, pharmacy, podiatric medicine, veterinary medicine, and physician assistants. In addition, information on chiropractors is provided for the first time.

This is also seventh in a series of reports to Congress on nursing supply, distribution, and requirements provided in response to Section 951 of P.L. 94-63 as amended by P.L. 95-623, and sixth in a series of reports on public health personnel that have been prepared in response to Section 794(c) of the Public Health Service Act as amended by P.L. 94-484 and P.L. 95-623.

Data on allied health personnel, included in the present report in accordance with the recent reauthorization of health professions legislation, provide a more complete coverage of major health personnel fields. The recent Report to Congress on the Study of the Role of Allied Health Personnel in Health Care Delivery (Institute of Medicine, National Academy of Sciences) pointed out the need for more information on allied health personnel.

In part as a result of health care cost containment efforts and growth in the supply of health personnel in the 1980s, the health care delivery system is undergoing rapid and substantial transformation. This report discusses the current status of health personnel in terms of their numbers and how they affect and are affected by changes in the health care delivery system and other health-related developments. It also provides projections to the year 2020 of future supply in most fields as well as information on future requirements for many categories of health personnel.

This Seventh Report to the President and Congress on the Status of Health Personnel in the United States differs from previous reports. In addition to chapters on specific health disciplines, overview chapters have been included which present brief discussions of current and emerging health and health personnel issues and major developments affecting health disciplines.

The health issues now facing the Nation include a rapidly increasing aging population (by year 2020 the population 65 years and older is expected to rise from 12 to 18 percent of the population), a continuing high infant mortality rate (the United States ranks 17th among 43 industrialized Nations), difficulties of access to medical care (particularly for rural and inner city populations), an AIDS epidemic, and widespread use of illicit drugs and other harmful substances.

The personnel issues discussed in this report are related to many factors including, of course, those health problems that have an impact on the demand for health personnel. One important issue is the nursing shortage which has been a major topic of discussion for several years and was analyzed most recently in the Report of the Secretary's Commission on Nursing. Similarly, recent reports on public health and allied health personnel by the National Academy of Sciences' Institute of Medicine have drawn attention to these major groups of health personnel. Other personnel problems that present serious challenges to our Nation include the declining pool of applicants and enrollees in many health disciplines, the concerns about the requirement for academically and professionally trained persons in geriatrics to effectively serve the increasing aged population, the underrepresentation of minorities in health disciplines, and the growing recognition of the importance to the Nation of primary health care services in general and in rural and inner city locations in particular.

The information presented is based on analyses of the latest available data and on the assessment by the Bureau of Health Professions of developments in the health fields. In addition, chapters on nursing and public health include recommendations on program activities, as required by the legislation.

This report analyzes a number of occupations that have widely differing educational requirements and receive support through different congressional mandates. Also, the analyses use databases and analytical frameworks that are not comparable from one occupation to another. Differences in contents of chapters largely reflect differences in the availability of current data and of studies on issues concerning the disciplines. Databases for medicine, dentistry, and a few other health professions are reasonably current and provide a substantial amount of relevant information for monitoring, analyzing, and planning. In addition, a number of useful research studies are available for these disciplines. By contrast, in the public health and allied health fields it is difficult to determine current and future supply of practitioners. As noted in two recent IOM studies, information on issues affecting these practitioners is sparse.

For some other professions, such as optometry, pharmacy, and podiatric medicine, available databases are outdated and are of limited use in analyzing recent developments. For occupations for which current and comprehensive databases are not available, workshop results, current literature, and discussions with professional associations have been used as sources of information. The chapter on data and methodology issues in this report discusses data and forecasting problems.

Variations in the information presented also reflect essential differences in context and focus of the many disciplines included and in issues and concerns surrounding them. Despite differences in presentation and limitations, this report should be a useful and comprehensive reference document that describes what is currently known about health personnel in the major health fields and what future developments are anticipated.

Chapter II

AN OVERVIEW OF MAJOR PERSONNEL DEVELOPMENTS

This section provides a brief statistical summary of some of the major health personnel findings of this report. More detailed discussion of these and other findings are presented in the chapters dealing with specific disciplines, chapters V to XVI.

Trends in Education and Training

o *The number of applicants to health professions schools has continued to decline in most health fields. The largest drop occurred in dental schools where the number of applicants fell to 5,017 in 1988-89, a 44 percent decline since 1980.*

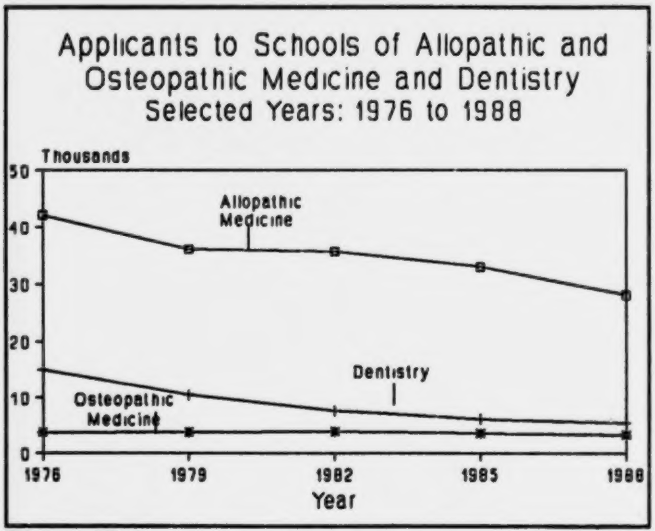


Figure II-1

- *Following major increases of the 1970s, first-year enrollments have also decreased in a large number of disciplines since 1980. Particularly sharp have been the declines in the number of first-year dentistry students, which have dropped steadily since 1981. However, the number of new entrants to medical schools rose about four percent in 1988, the first such increase in 7 years.*

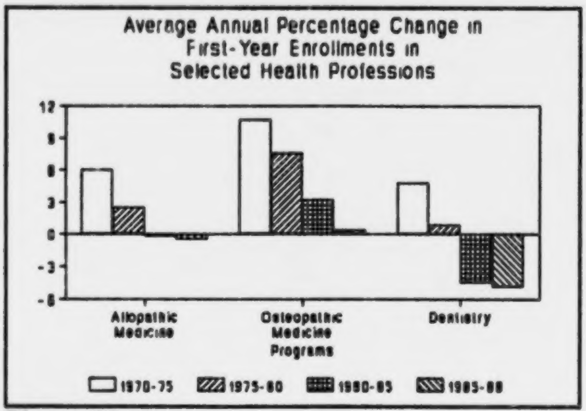


Figure II-2

- *Registered nurse programs have shown declines in first-year admissions and enrollments during the later half of the 1980s. In 1987, however, the number of such admissions grew four percent, possibly signaling a reversal of the downward trend of the past few years.*

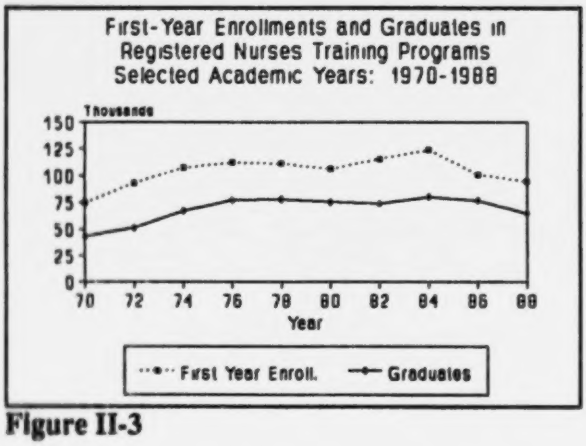


Figure II-3

- *Female enrollments in health professions schools have continued to rise throughout the 1980s, while male enrollments in many disciplines have declined. Women now compose 25 percent or more of the total enrollment in the major health professions. All fields showed significant gains, with schools of pharmacy and veterinary medicine having more female than male students.*

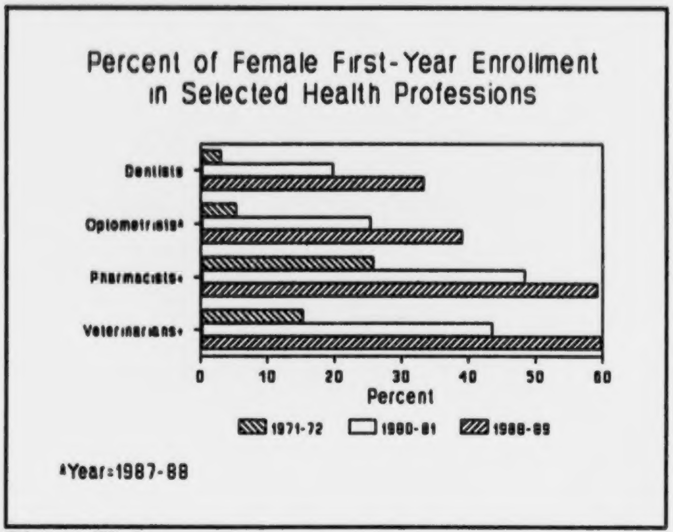


Figure II-4

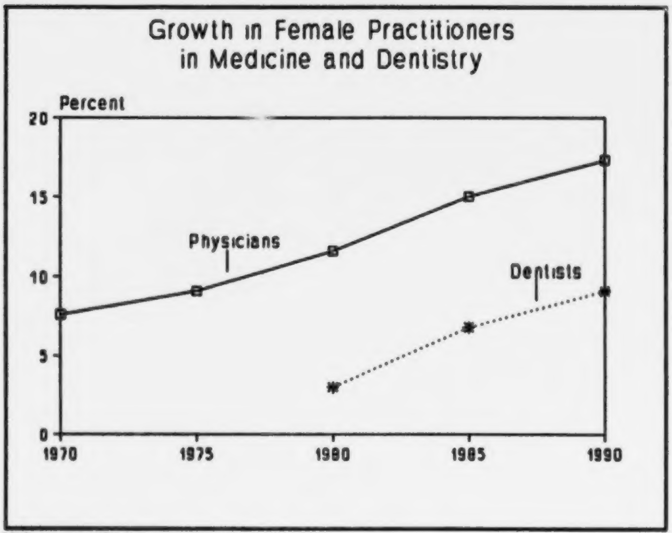
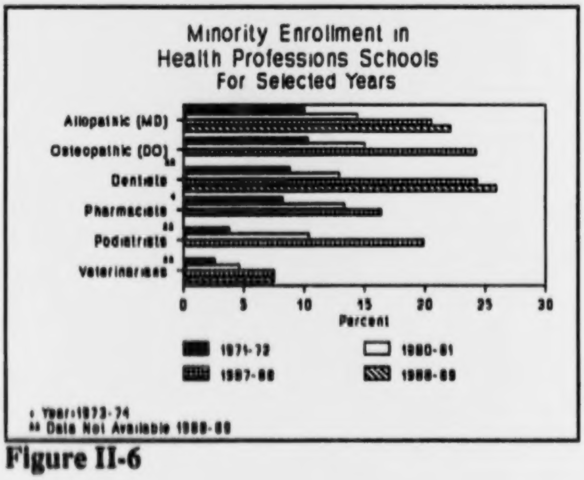


Figure II-5

- *Minority enrollments in selected health professions schools have risen over the past few years and first-year and total enrollments were generally up from the levels of the early 1980s. Black enrollments, however, have increased less than those of other minority groups.*



* Year: 1973-74
** Data Not Available 1988-89

Figure II-6

- *Despite the recent enrollment declines, the numbers of graduates from some health professions--osteopathic physicians, veterinarians, optometrists--have shown small increases as compared to academic year 1980-81. Decreases in graduates have occurred among registered nurses, pharmacists, and dentists.*

Number of Graduates of Selected Health Professions Education Programs

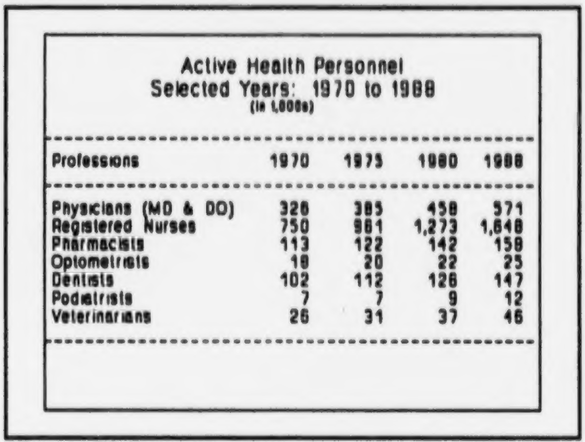
Professions	1970-71	1980-81	1987-88
Total Physicians	9,446	16,818	17,194
(Allopathic Medicine)	8,974	15,667	15,630
(Osteopathic Medicine)	472	1,151	1,564
Registered Nurses	46,455	73,985	65,845
Veterinarians	1,239	1,932	2,169
Pharmacists	4,747	7,323	6,184
Optometrists	528	1,092	1,106*
Dentists	3,775	5,550	4,519
Podiatrists	241	597	590

*1986-87 data

Figure II-7

Current Supply of Health Care Personnel

- *The number of active health personnel continued to rise in the late 1980s as the number of new graduates was more than enough to offset attrition among active practitioners. However, the rate of increase in nearly all fields was less than in the 1970s and early 1980s.*



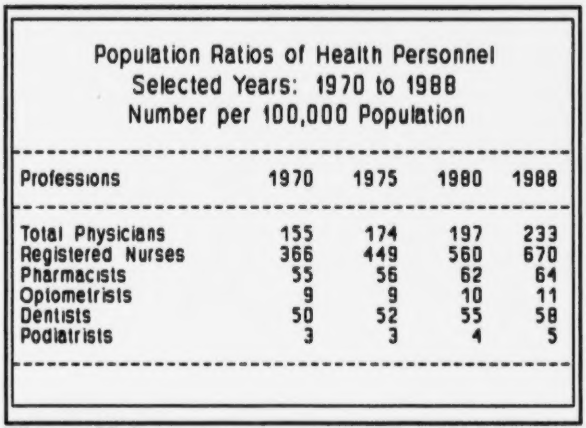
Active Health Personnel
Selected Years: 1970 to 1988
(in 1,000s)

Professions	1970	1975	1980	1988
Physicians (MD & DO)	326	385	458	571
Registered Nurses	750	961	1,273	1,648
Pharmacists	113	122	142	158
Optometrists	18	20	22	25
Dentists	102	112	126	147
Podiatrists	7	7	9	12
Veterinarians	26	31	37	46

Figure II-8

- *Even though increases in the supply of health personnel slowed down in the late 1980s, growth in the number of active health professionals outpaced population growth.*

- *Practitioner/population ratios in the late 1980s were at their highest levels on record.*



Population Ratios of Health Personnel
Selected Years: 1970 to 1988
Number per 100,000 Population

Professions	1970	1975	1980	1988
Total Physicians	155	174	197	233
Registered Nurses	366	449	560	670
Pharmacists	55	56	62	64
Optometrists	9	9	10	11
Dentists	50	52	55	58
Podiatrists	3	3	4	5

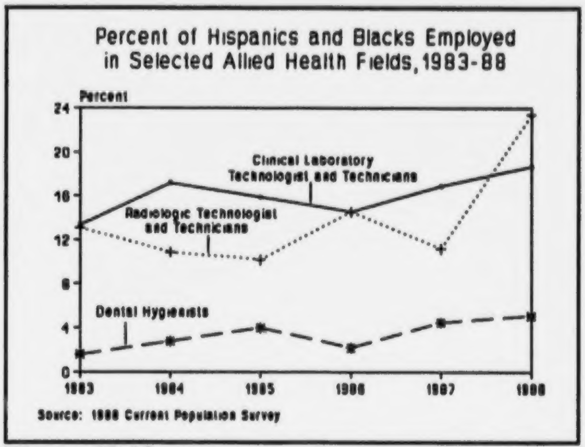
Figure II-9

- *Despite increases in total number of active registered nurses, the rise in demand for nurses by hospitals and other health care sectors has led to an overall shortage of registered nurses in recent years.*

- *The supply of allied health personnel increased during the 1980s, but more slowly than during the decade of the 1970s and early 1980s. The allied health occupations that grew most rapidly during the 1980s were: dieticians and dietetic technicians, speech pathologists and audiologists, cytotechnologists, occupational therapists, physical therapists, and medical technologists.*

- *The number and proportion of women in traditionally male health professions continues to increase rapidly.*

- *Minority practitioners remain a relatively small proportion of the work force in most health professions.*


Percent of Hispanics and Blacks Employed in Selected Allied Health Fields, 1983-88

Source: 1988 Current Population Survey

Figure II-10

Issues Affecting Health Personnel

- *Elderly persons, by far the largest per capita users of health care services, are increasing more rapidly than the rest of the population. This growth will continue well into the 21st century, slowing between 1990 and 2010, and then mushrooming between 2010 and 2030 as the post World War II population reaches age 65.*

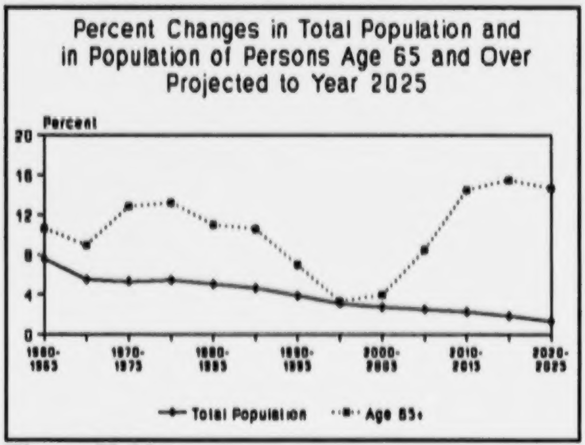
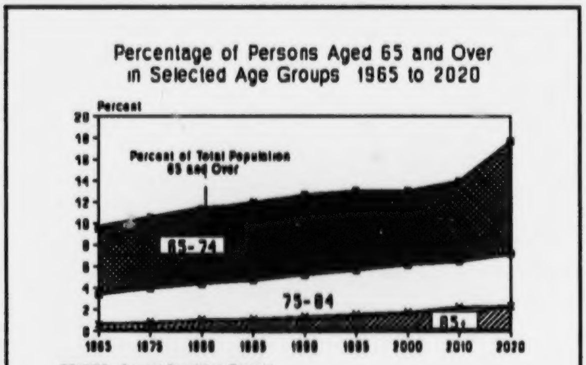


Figure II-11

- *Since the number of persons 85 and above will grow markedly, increased demand for long term care providers is anticipated.*



SOURCE: Current Population Reports Population Estimates & Projections, 01-1088, Bur of Census Middle Series

Figure II-12

- *Substance abuse and AIDS will continue to be major health problems in the years ahead, creating a demand for health personnel with specialized training in these areas. Many training programs for health care personnel have begun to integrate substance abuse and AIDS content into educational programs.*

- *Changes in methods of payment for medical services, emphasis on cost containment, advances in technology, increased attention to quality of care concerns, and changes in the case mix and treatment methods will continue to have an impact on the structure and delivery of services of the health care industry. Responsive changes in the training and functions of health personnel will be needed.*

Health Personnel in the Coming Years

- *Relatively slow growth in the supply of most health professions is expected in the years ahead, especially between the years 2000 and 2020. The slowing of growth reflects the smaller size of graduating classes during the late 1980s and early 1990s and increasing attrition among practicing health care professionals due to death and retirement.*

- *Although the rate of growth will slow in the short run, the numbers of personnel and ratio to population will continue to rise in medicine and most other health professions. However, geographic maldistribution and problems of access to care in rural and inner city areas and for some population groups are expected to continue.*

- *The numbers of active nurses and dentists, after rising somewhat above 1988 levels through the early years of the twenty-first century, are now projected to be lower in the year 2020 than in 1988. The number of nurses, 1,710,000 in 1988, will peak at 1,950,000 in 2005 and then drop to 1,640,000 in 2020. The number of RNs per 100,000, which was 670 in 1988, will decline after 2005 to a level of 558 per 100,000 in 2020. The supply of dentists will peak by the year 2000 at 155,000 or 58 dentists per 100,000 population and then decline to 141,000 or 48 per 100,000 by 2020, compared with 147,000 dentists and 59 per 100,000 population in 1988.*

In view of the major changes occurring in the health care delivery system and in health professions schools, it is difficult to say with any certainty that the supply of health personnel will be adequate to meet the Nation's requirements for health care in the future, particularly after the year 2000. In medicine it appears that the overall supply of physicians will be more than adequate to meet the Nation's needs and could very well increase faster than the demand. However, despite general physician availability, some areas cannot secure enough physicians to meet their health care needs. Both urban and rural poor have actually lost ground. Throughout the U.S. there is an average of 82.4 physicians per 1,000 population, but only 20.4 physicians per 1,000 in designated health manpower shortage areas. Available evidence indicates that persons trained for practice in specialized areas--particularly in nursing, public health, and allied health--may remain in short supply.

CHAPTER III

CURRENT AND EMERGING HEALTH ISSUES

Introduction

Significant improvements in health status have been occurring in the United States in recent years. Technological advances including new drug therapies and organ transplants have increased survival rates for diseases that previously were fatal. Aggressive health promotion and disease prevention programs have reduced smoking, improved nutrition, and encouraged physical exercise and, as a result, have lowered death rates from heart disease and stroke. Improvements in health status also have been made because of early diagnosis, which has led to better outcomes in diseases such as diabetes, hypertension, and periodontal disease.

Despite impressive advances a number of severe health problems still exist. Improvements in health status have not benefited the U.S. population uniformly. Many segments of society have high rates of illness and premature death. Problems such as AIDS and substance abuse have become major public health concerns in recent years, while others such as a high infant mortality rate have resisted solution. Aging of the population is accompanied by increases in health problems, many of a chronic nature.

Other health issues that require forethought and planning include the organization, financing, and delivery of health services. Costs of health care in the United States, rising twice as fast as the inflation rate in recent years, now place this country well above any other Nation in percentage of gross national product expended on health care, 11 per cent. More and more people are finding it difficult to pay for needed health care even with health insurance. There are an estimated 32 million Americans who have no health insurance at all and are at risk of being denied appropriate medical and dental care.

Finally, there is a question of the quality of care that is provided in our heterogeneous health care delivery system. Quality of care issues have received much attention as health care costs have risen so high that the cost/benefit ratios of expensive interventions are being questioned. Possible need to limit certain services has been discussed as escalating costs impair the Nation's ability to provide all the resources required.

These issues are cross-cutting, e.g., the AIDS epidemic that strains the health care delivery system and contributes to rising costs is also related to the high prevalence of substance abuse. Furthermore, they are not only immediate issues, but will be present for many years. The aging population will have its greatest impact 30 to 40 years from now when the World War II " baby boom" cohort reaches old age.

The health issues selected for discussion are important because they influence the numbers and types of health care providers in the health care delivery system. Persons with AIDS, for example, require a wide range of services from a variety of health care providers in every type of health care setting--ambulatory, acute care, and long term care facilities. The role of health care providers in lowering infant mortality rates is well documented. An aging population will require large increases in numbers of health professionals with appropriate knowledge and skills in geriatrics. Improving access to health care requires additional primary care personnel. Constructive responses to these current and emerging health issues will undoubtedly call for increases in numbers and training of personnel. Improvements in service will not be easy to achieve considering current shortages of health personnel such as nurses, declining applicants to health professions educational programs, closing of a number of educational programs, and cutbacks in funding levels for training health professionals. If progress is to be made in addressing these important health problems that affect everyone, considerable attention must be given to an assessment of the supply of health professionals and their levels of preparation, now and into the future. It is the purpose of this report to provide such an assessment.

Aging Population

The population of the United States in the age group 65 years and over--the elderly--is increasing more rapidly than the population as a whole. While the total population is expected to grow by 0.6 percent each year until the year 2020, the elderly population will grow by 1.8 per cent annually. Those 85 years of age and over, the oldest old, will grow at the fastest rate of all--2.9 percent annually over the next thirty years. By the year 2020 a population of 54 million people in the age group 65 years and older is projected, 25 million more than in 1986 (DHHS, 1985).

The aging of the population will make a significant impact on the utilization, financing, and delivery of health care (Waldo, 1984). Since annual per capita utilization of and spending on health care is several times higher for the elderly than for the population as a whole, health care expenditures will grow at a faster rate. Although covered by Medicare, the elderly are faced with rising premiums for this insurance and potentially large out-of-pocket expenditures for uncovered services, particularly for long-term care.

In addition to the growing number of people aged 65 years and older, there is a large segment of the population born right after World War II--known as "baby boomers"--now entering their early to mid forties. Although middle aged people do not use health services as extensively as do the elderly, they do utilize more than younger people. And as they age they will put even more pressure on the health services system.

Demographic Characteristics

The population of the United States has aged dramatically since the beginning of this century. In 1900 only 4 percent of the population were 65 years or over. In 1986 this group had risen to about 13 per cent of the population or 30 million people and is expected to grow rapidly to 21 percent in 2020 and 30 percent in 2050 (Aging America, 1987-1988). In 1986, 12.4 percent of older Americans lived below the poverty level, with women more likely than men to be poor and alone. A breakdown of those living below the poverty level showed: Black, 31 percent; Hispanic, 22.5 percent; White, 10.7 percent. Further, 25 percent of elderly live in rural areas, which are usually poorly served in a health sense (U.S. Senate, 1988a).

That there are more elderly people today, in addition to reflecting better quality of health care and medical advances leading to longer life expectancies, is also the result of high birth rates during the early 1920s. The even larger increases in the number of elderly projected by the year 2020 also will be the result of high birth rates after World War II.

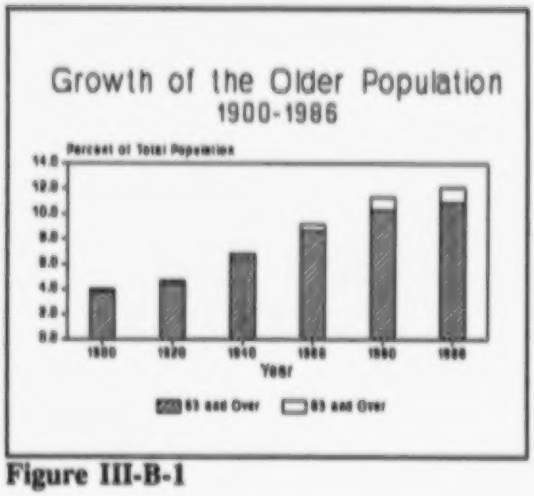


Figure III-B-1

In 1900 life expectancy at birth was about 47 years whereas in 1987 it was nearly 75 years, an increase of 28 years, much of the improvement due to decreases in infant mortality. In 1900 a person 65 years of age could expect to live 12 years longer; in 1987 a 65-year-old could expect to live 17 years longer (18.6 for females and 14.8 for males). What is most notable is the large increase among the oldest old, 85 years of age and over. In 1900 only 123 thousand people were in this category, whereas today it numbers 3 million people. By 2020 over 7 million people are expected to be 85 years and over (U.S. Senate, 1988b).

Health Status of the Aging Population

Overall, older Americans view their health positively with only 30 percent viewing their health as fair or poor. The higher the income the more likely the perception will be positive. Most of the young elderly are relatively healthy and not as limited as frequently assumed, despite the prevalence of chronic illnesses. Advancing years bring about a decline in health and mobility, with significant limitations evident for many in their eighties and nineties (U.S. Senate, 1988b).

In addition to physical limitations a significant proportion of the elderly have mental health problems. Impairments of mental health, including depression, Alzheimers Disease, and other dementias and schizophrenia, affect about one-quarter of the elderly population. Many mental conditions begin to appear during the early fifties and worsen with age.

Use of Services by the Elderly

The health care system, now and in future, will have to respond to the aging of the population. As people age they make greater use of health services than do younger persons. In 1987, for example, the rate of discharges from short-stay hospitals according to the National Health Interview Study was 69.2 per 1,000 population for persons 15-44 years of age, 143.3 for those 45-64, and 255.8 per 1,000 for those 65 years of age and over (DHHS, 1989).

The high prevalence of chronic conditions among the elderly and the functional limitations that result generate a large demand for diagnostic, therapeutic, rehabilitative, and supportive services. Although people 65 years of age and over make up only 12 percent of the population, nearly half of the average daily census in short-term hospitals consists of people in this age group. Three-quarters of all home health care visits are made to elderly people who comprise nine patients of every ten in nursing homes (DHHS, 1987). Per capita expenditure on personal health care is over three times as high for those 65 years of age and over than for younger people. One reason for this disproportionate spending is that the last year of a person's life is usually a period of high levels of medical care utilization. Data from Medicare show that average annual reimbursements are four times as high for enrollees who died during that year than for those who survived--nearly $5,000 per decedent compared to $1,200 for survivors (Lubitz, 1984).

Future Prospects

The use of health services by the elderly will undoubtedly increase as this age group grows from 30 million in 1986, 12 percent of the total population, to 54 million in 2020, 17 percent. By the year 2030 there will be 64 million elderly, 21 per cent of the total population. Moreover, the increasing proportion of the oldest old, 85 years and over, will have the greatest need for health services.

If current usage rates by the elderly were to continue, there would be twice as many physician visits and hospital stays in the year 2020 than at present and almost three times as many elderly residents in nursing homes than the current 1.3 million (DHHS, 1987). However, a number of developments may modify these rough estimates. Actual future usage of health services will depend on the health needs of the elderly, interventions available to address these, future structure of the health care delivery system, sources and levels of financing, and the role of professional health care providers vis-a-vis informal caregivers, particularly in the areas of supportive and maintenance services. Nevertheless, it is clear that overall demand by the elderly for health services will increase as a result of the increases in the number of people 65 years of age and over.

Impact on Health Personnel

The aging of the U.S. population will significantly affect demand for health care personnel in the future. Health care needs of the elderly range over the entire spectrum of services, from preventive services to acute care to long term care. The youngest elderly, those 65 to 74 years of age, have high rates of hospitalization for diseases of the heart, malignant neoplasms, and other acute problems. The oldest old, those 85 years of age and over, have high rates of chronic incurable diseases with multisystem failures and functional decline and usually require some assistance in coping with activities of daily living.

Mental health needs also increase with age. Since a higher proportion of the elderly are retaining their natural teeth, there is likely to be an increased demand for dental services. It is currently estimated that more than 80 per cent of elderly people have one or more dental-related problems (DHHS, 1987).

To achieve improvements in health status of the elderly will require expansion in health promotion and illness prevention services, including regular physical check-ups, and rehabilitative services. An important continuing objective is to enhance the quality of life among the elderly. This requires a concerted and coordinated effort among both formal health care providers and informal care givers.

Many different health disciplines are needed to care for the elderly in a number of different settings including community-based programs for the ambulatory, patients' homes, hospitals, and long-term care facilities. An interdisciplinary approach to care is necessary because health problems are apt to be varied, complex, chronic, and require continuity and coordination of care. Nurse practitioners and physician assistants, among non-physician health care providers, are well prepared to serve as case managers in the care of elderly patients. As managers they coordinate a case with physicians, social workers, physical therapists, and other professionals. In addition, assistance in living at home, provided by home health personnel including home health aides to dispense homemaker services, is needed. The participation of family and friends as informal care givers is especially important. The significance of support systems at home is seen in the reduced use of nursing homes when an elderly patient has a care giving spouse or other family member at home.

The September 1987 Report to Congress on Personnel for Health Needs of the Elderly provides a detailed analysis of health personnel issues related to the aging population. A great need is projected for more adequately trained personnel for the care of older people. Better prepared personnel will be needed across the entire spectrum of health services, especially in such high priority programs as community-based and home care, nursing home care, and rehabilitation therapy. Increases in health promotion and illness prevention services will require additional trained personnel.

Nursing homes are an especially high priority area. Not only will there be a substantial increase in the number of residents, but intensity and complexity of services will increase as lengths of stay in short-stay hospitals are curtailed, the average age of residents rises, and technological improvements in delivery of health care are made. Home health programs will also be affected by these same factors and will require higher levels of training among care givers than currently exist in order to provide highly technical acute care services.

As is discussed in the section on Geriatrics, resources for training to meet health care needs of the elderly include specialized training programs for geriatric education and faculty to provide training for other professionals. In 1986 less than a third of faculty members were reported to have received formal academic training in these fields (DHHS, 1987). For the last several years the Federal government has allocated $50 million a year for training in geriatrics and gerontology through the Area Health Education Centers and Geriatric Education Centers funded by the Bureau of Health Professions (USPHS), and through other agencies, including the Administration on Aging, National Institute on Aging, and Department of Veterans Affairs.

The importance of training for health personnel is readily apparent. Only with appropriate knowledge and skills can health care personnel of many disciplines deal with the diversity of health care problems presented by the elderly.

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Infant Mortality

Infant mortality--the death of live-born children who have not yet reached their first birthday--has been a health issue in the United States for a very long time. At the turn of the century the infant mortality rate (the number of infant deaths per 1,000 live births occurring during a year) stood at 100. In 1950 the rate was a little under 30 and in 1970 it was 20. In 1987, the latest year for which data are available, the rate was 10 (DHHS, 1989).

However, although the infant mortality rate has been declining steadily for the past 50 years, improvement has been less in recent years than earlier. The decline in infant mortality in the 1970s was attributed in large part to advances in neonatal intensive care and dissemination of pertinent information throughout the country, which, in turn, led to a sharp reduction in mortality among low birthweight infants. There was also a small gain in average birthweight, but during the 1980s no further improvements in birthweight distribution were achieved.

Numerous and complex factors influence infant mortality, including demographic, medical, physical, environmental, educational, behavioral, and attitudinal factors as well as access to resources. A number of possible explanations for the failure to further reduce infant mortality during the 1980s are:

- *Reduction in some publicly supported programs of care to low-income women and women who are outside the health care delivery system.*
- *Changing maternal behavior and characteristics that may increase the number of women at greater risk for poor pregnancy outcomes, e.g., substance abuse; teenage pregnancy (although current data show a downward trend).*
- *Improved reporting of infant deaths.*
- *Approaching maximal benefit from advances in neonatal intensive care.*
- *Successfully lowering fetal mortality, but delivering a live child at high risk.*
- *Continued shortage of perinatal care providers in some underserved areas.*

Table III-C-1

Infant Mortality Rates
Selected Countries, Mid-1980s

Infant Mortality Per 1,000 Live Births

5.0-7.9		8.0-9.9		10.0-11.9		12.0 and above	
Japan	5.5	Netherlands	8.0	Italy	10.3	Malta	13.2
Iceland	6.1	France	8.3	**United States**	**10.6**		
Finland	6.3	Norway	8.5	New Zealand	10.9		
Sweden	6.8	Spain	8.5	Austria	11.2		
Switzerland	6.9	Ireland	8.8	Israel	11.9		
Hong Kong	7.5	Fed. Repub. Germany	9.0				
Canada	7.9	Luxembourg	9.0				
Denmark	7.9	Singapore	9.3				
		Belgium	9.4				
		United Kingdom	9.4				
		German Dem. Rep	9.6				
		Australia	9.9				

Infant mortality rates for White and Black infants vary widely; the rate for Blacks in 1986, 18.0, was twice that for whites, 8.9. Ten years ago the United States ranked fifteenth among major Western Nations of the world in infant mortality. It now ranks behind 21 other reporting entities, a distressing statistic that shows that others are making more progress in improving their mortality rates than we are. It does not seem likely that the U.S. will be able to achieve a rate of nine infant deaths per 1,000 live births by 1990, a goal established by the U.S. Public Health Service as a national health objective for that year (DHHS, 1986).

The causes of infant mortality have been well documented. Infant mortality consists of two components--neonatal mortality, deaths occurring under 28 days of age, and postneonatal mortality, deaths occurring from to 28 days to 365 days after birth. About two-thirds of all infant deaths occur among those under 28 days of age. A major factor in these deaths is low birthweight. Nearly 70 per cent of all infants who die were born with low birthweights. Most low birthweight infants are born prematurely. Prematurity may be due in part to a genetic disorder, but is most often associated with a lack of prenatal care (DHHS, 1986). Adverse lifestyle of the mother during pregnancy--poor nutrition, smoking, alcoholism, and drug abuse--is also contributory. Adolescents are very likely to give birth prematurely and to have low birthweight infants. The neonatal mortality rate is especially high for infants of adolescent mothers and for those with inadequate prenatal care. Postneonatal mortality, although lower than neonatal mortality, accounts for about 14,000 infant deaths a year. Sudden infant death syndrome (SIDS) is the leading cause of postneonatal mortality, accounting for more than a third of these deaths. Although the cause of this syndrome is not yet fully understood, genetic factors are believed to be important. While genetic factors as well as low birthweight play a role in postneonatal deaths, lack of adequate prenatal and postnatal care may be even more significant.

Despite the sharp decline in the national infant mortality rate over the past 50 years many infant deaths remain preventable and further decline is possible particularly by lowering the rate for Black infants. The key here is improvement in the conditions leading to infant birthweight, since low birthweight is a major cause of infant deaths. The difference between birthweights for Blacks and Whites is very striking. In 1986 the percentage of live births for Whites with birthweights of less than 2,500 grams was 5.64, and 0.93 percent for birth weights under 1,500 grams, versus 12.53 percent and 2.66 percent respectively for Blacks. Among Whites 3.7 percent of the mothers were younger than 18 years of age while among Blacks, the percentage was 10.4, nearly three times that for Whites.

The report on the 1990 Nation's Health Objectives provides specific measures for preventing infant deaths. Nineteen objectives are directly related to pregnancy and infant health, and, of these, thirteen were designated as having high priority for Federal effort. The high priority objectives include:

- *Reducing the national infant mortality rate to 9 deaths per 1,000 live births (the latest rate is 10).*
- *Reducing the infant mortality rates for all racial and ethnic groups to not more than 12 deaths per 1,000 live births (the rate for Blacks is 18).*
- *Reducing the percentage of total low weight births (under 2500 gr.) to not more than 5 percent (the latest percentage is 6.8).*
- *Reducing the percentage of low weight births for each race to not more than 9 percent (the rate for Blacks is 12.7).*
- *Achievement of these objectives has implications for health personnel. Among the Federal measures proposed to achieve the objectives by 1990 that have these implications are:*

  The need to assist State and local health agencies to develop and implement coordinated systems for prenatal and perinatal care.

  The need to continue the Maternal and Child Health (MCH) Block Grant program to provide resources for State maternal and child health services.

  The need to provide maternal and child health service in Health Manpower Shortage Areas through placement of National Health Service Corps professionals.

> *The need to assist States and other jurisdictions to improve the capability of Title V (MCH and Crippled Children Services) agencies to develop and implement effective State programs for the health care of mothers and infants and continued support of perinatal initiative funding in community and migrant health centers.*

Health professionals, particularly those engaged in primary care, such as physicians, nurses, and nurse-midwives can significantly contribute to improvements in the infant mortality rate, particularly if their services, like those of nurse midwives, are directed to high risk mothers and infants. The role of health care providers in betterment of maternal and child health is supported by an impressive body of research (Hughes, 1987). Nevertheless, there has been a decline in services available in recent years. According to a recent survey of obstetricians, an increase in malpractice suits and high costs of malpractice insurance caused 27.1 percent of respondents to decrease their level of high risk obstetrical care. Over 12.4 percent have left the practice of obstetrics completely (ACOG, 1988). However, a slowing of increases in costs of malpractice insurance for physicians was recently reported that may help make care more available (Medical Economics, 1989). Nurse-midwives, too, have had serious problems with insurance. In 1985 the American College of Nurse Midwives was notified of the cancellation of liability insurance coverage for its two thousand members, but as a result of Congressional intervention coverage has since been restored.

On the positive side has been the initiation of programs within recent years aimed at reducing infant mortality and improving the health of mothers and children. The Adolescent Family Demonstration Program, adopted in 1981, is designed to provide States with workable models of comprehensive programs to demonstrate effective care and primary prevention services for pregnant adolescents and adolescent parents. A number of projects have been established to address the risk factors associated with infant mortality. For example, the Northwest North Carolina Prematurity Prevention Project has shown a positive effect on birthweight through risk assessment of all patients, education of patients and providers, and intensive prenatal care for patients at risk with weekly visits and cervical examinations after 24 weeks of gestation (Buescher, 1988). Participation in the study reduced the incidence of low birthweight White infants by 31 percent and of Black infants by 47 percent. The costs of the prevention projects were modest, especially considering the positive outcomes. Not only was infant mortality reduced, but it is probable that these children, with a better start in life, are more likely to enjoy better health status in later years.

In 1988 a combined initiative was established by the Robert Wood Johnson Foundation and the Bureau of Maternal and Child Health and Resources Development (BMCHRD) to fund projects to the States with high infant mortality rates to make more services available.

BMCHRD has funded six projects and RWJ has funded five projects in a programmatic effort known as Healthy Generations and Healthy Futures aimed at lowering infant mortality rates.

The reduction of infant mortality in this Nation is clearly related to the availability of primary care services during the prenatal period. In addition to physicians and nurses, other health disciplines, e.g., physician assistants, dentists, and substance abuse counselors can play important roles in this care. Infant mortality improvements are not only possible with primary care activities performed by public health personnel in State and local health departments, but, in fact, these public agencies deal with those who need help the most.

Cost benefit ratios of programs to improve infant mortality are potentially very favorable. Care of low birthweight infants born prematurely in neo-natal intensive care units is very expensive. Good prenatal care that could prevent prematurity and low birthweight is far less costly. Thus, lives can be saved and health can be improved through the provision of prenatal services with relatively modest expenditures of resources. Indeed, the prevention of infant deaths and the promotion of infant health provide an outstanding example of the efficiency and effectiveness of health promotion/disease prevention programs.

The effective role of health professionals in the provision of prevention services to and treatment of mothers and children is clear. While the services of health professionals alone will not insure large-scale improvements in infant mortality since personal lifestyle as well as social, economic, and educational factors also exert important influences, they do provide the foundation upon which effective programs can be based.

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Human Immune Deficiency Virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS)

Scope of the Disease

Cases characteristic of acquired immune deficiency syndrome (AIDS) were first reported to the Centers for Disease Control (CDC) in 1981. A retrovirus, the human immunodeficiency virus (HIV), acts directly on the body's defense mechanisms to render the host immunoincompetent and therefore susceptible to malignancies and multiple opportunistic infections that eventually result in death. Not since the 1918-1919 influenza pandemic, or the polio epidemic prior to World War II, have the United States Public Health Service, State, and local health agencies been so strained by a disease of such magnitude.

As a pandemic, HIV-disease is spreading relentlessly throughout the world. A 1988 Pan American Health Organization (PAHO) report revealed that only 34 countries had reported zero cases of AIDS (PAHO, 1988). Worldwide, over 250,000 AIDS cases and 500,000 additional symptomatic HIV-infected people were estimated. There has been a marked similarity in the rate of increase of AIDS cases for the five continents (Africa, America, Asia, Europe and Oceania) during the 10 year period 1978-1988. Although Africa is believed to have the largest number of HIV-infected people, the United States, which has more sophisticated reporting capabilities, has the largest number of documented AIDS cases.

Since AIDS was first reported in 1981, State and territorial health departments have reported more than 100,000 cases of AIDS and more than 59,000 AIDS-related deaths to CDC (DHHS, 1989a; AMA, 1989). It is estimated that 1.0 to 1.5 million people in the United States are infected with HIV and the number continues to increase (DHHS, 1989a). Although cases of AIDS were first reported in New York City and San Francisco, it soon became evident that AIDS was a nationwide problem. While metropolitan areas of over one million people contain about 41 percent of the population, they have reported 75 percent of the AIDS cases. By 1989, all 50 States, the District of Columbia, Puerto Rico and the Virgin Islands had reported cases of AIDS; the incidence rates varied considerably, ranging from a high of 87.4 cases per 100,000 in the District of Columbia, to less than 1 per 100,000 in North Dakota. Among the States, rates were highest for New York (35.1 per 100,000), New Jersey (30.8) Florida (25.4), California (20.2), Georgia (15.6), Nevada (13.6), Maryland (13.5) and Connecticut (13.1); North Dakota had the lowest rate, 0.7 per 100,000 (DHHS, 1989a).

About 65 percent of all reported patients with AIDS are homosexual men. At first considered a disease of homosexual and bisexual men, AIDS has been increasingly reported among intravenous drug users who have shared needles. The estimated 1.1 to 1.3 million intravenous drug abusers in the United States have a great potential for disseminating HIV-infection; in addition to parenteral transmission, their sexual partners and their children in utero are also at considerable risk for HIV-infection. Infants with AIDS, many of whom have been abandoned and remain as "ward-patients" in hospitals, place an ever-increasing strain on public and private resources. Of the 1,681 reported pediatric AIDS cases, 57 percent are attributable to the mother's IV drug usage or the mother's having had sex with an IV drug user. AIDS is now a major cause of morbidity and mortality in children and young adults in the United States, ranking fifteenth among leading causes of death in 1988 (DHHS, 1989a).

Drug dependent teenagers, largely undereducated and unemployed, often resort to prostitution (male and female) to support their habit, thereby acting as a conduit for spread of HIV-infection into the heterosexual population. These teenagers pose a particular problem, partly due to the popularity of "crack" cocaine, a highly addictive drug which (in contrast to other drugs) enhances libido and promotes promiscuity--"crack for sex."

HIV-infection can also be inadvertently spread by the parenteral administration of HIV-contaminated blood and blood products. Transfusion-associated AIDS account for a considerable percentage of cases in children and adult females. However, since screening seriological tests for HIV were implemented in 1985, the blood supply in the United States has become among the safest in the world. The CDC reported recently that 11 percent of adult female cases and 19 percent of pediatric cases have been associated directly or indirectly with transfusions or hemophilia.

Impact on Health Personnel

The burden of coping with AIDS and its associated complex of opportunistic complications has created a public health crisis. The over 100,000 cases reported by CDC in July 1989 have not only drained the financial resources of those afflicted, but also have tested the skills and dedication of the providers caring for them. Health personnel involved include the entire spectrum of health disciplines--physicians, nurses, dentists, emergency medical technicians, all personnel employed in hospitals, and personnel in public health agencies.

The HIV/AIDS epidemic has produced a range of reactions among health professionals. In the early 1980s, the ramifications of this new disease were not at all clear. What was known was that the causative agent was transmissible, and that the disease was fatal. Many care providers reacted with fear and avoidance, often refusing any contact with AIDS patients. Even now some providers fear social and professional isolation if it becomes known that they have had contact with AIDS patients.

However, many have responded with admirable dedication to provide needed care to those afflicted with this disease. Among others, the reactions have included: fear; anger; helplessness; burnout; a re-examination of personal prejudices toward homosexuality; anxieties associated with learning and practicing infection control; anxieties associated with keeping abreast of a rapidly expanding literature that includes changing and toxic treatment modalities; emotional situations resulting from contact with HIV-affected patients, families and friends; and the highly stressful situation of dealing with dying and death among relatively young and previously healthy individuals since at the time of their diagnosis, nine of ten AIDS patients are between the ages of 20 and 49 (AMA, 1988). Therefore, it has been necessary to recognize and address the neuropsychiatric and psychosocial aspects of the disease, not only for health professionals, but those of other professions as well.

Many professionals, because they believe that they lack sufficient education or training, feel inadequate to deal with the medical, emotional, and social ramifications of this complex and disturbing disease. Some health professionals even question whether they are obligated to treat AIDS patients. Even though the American Medical Association has affirmed that physicians cannot refuse to treat AIDS patients--and physicians traditionally have always treated highly infectious diseases--other health personnel and hospital workers may be at greater risk from the infection than physicians, partly from longer periods of contact with patients and medical wastes, although with proper precautions this risk is minimal.

Hospitals have been quick to implement stringent precautions and procedures for personnel and the number of reported AIDS cases among those workers has been low. However, public hospitals, which traditionally care for the poor, have other problems. A survey reported that only 20 percent of public hospitals treat almost 80 percent of AIDS patients. This has severely strained both their financial resources and ability to care for other types of patients, which, in turn, affects their ability to give new physician graduates a well-rounded clinical training experience. A further problem is that of health care professions students who develop AIDS, e.g., one student was dismissed from his dental education program.

Nurses

Nurses are the largest group of health professionals caring for HIV-infected people, providing care in a variety of acute care and other settings. Nurses function as educators, counselors, and discharge planners for AIDS patients and their families. Nurse clinicians and nurse case managers, who are responsible for health assessment, planning, procurement, delivery, coordination, and monitoring of services, will be needed in greater numbers. They will require additional training and education to handle the AIDS patient population. Community health nurses also contribute significantly, seeing patients at home and participating in the community's efforts to educate the public. Because AIDS will require increasing numbers of nurses, it may contribute to the nursing shortage.

Physicians

AIDS patients place extra demands on physicians. Patients who are HIV-positive, but asymptomatic, visit a physician approximately four times a year and patients with AIDS make approximately 15 physician visits a year. Furthermore, an estimated 15 million non-infected people will see a physician, often more than once, to be tested for HIV or to receive counseling and education. According to the Federated Council for Internal Medicine, 65 percent of all physician visits for AIDS and AIDS-related conditions will be to internists, of which 89 percent will be to general internists. Many internists feel a lack of expertise and complain that available training courses do not have sufficient depth to enable them to treat the disease confidently. Regarding the impact of AIDS on the medical care system, Deborah Cotton has noted that: "No existing specialty in medicine encompasses in-depth the skills necessary to provide care throughout this wide spectrum" of the status of patients with AIDS, which ranges from no symptoms to terminal illness (Cotton, 1988).

Dentists

AIDS patients are at high risk for dental problems. Dental health professionals frequently come into contact with patient blood creating a work-related risk for transmission of HIV infection. Many are unwilling to treat HIV-infected patients because they are fearful of contracting the disease, fearful of losing other patients, and infecting families and staff. They are also apprehensive about lacking appropriate skills to effectively treat these patients. Thus, considerable HIV-related education is needed for dental health professionals.

Physician Assistants

Physician Assistants (PAs) are actively involved in the treatment of HIV-infected people at all levels, from ordering tests to counseling patients. In many instances PAs are at the forefront of primary care of AIDS patients. A Multidisciplinary Curriculum Development Conference (1987) on HIV-infection, jointly sponsored by the Health Resources and Services Administration's Bureau of Health Professions (BHPr) and the Bureau of Maternal and Child Health and Resources Development (BMCHRD), reported that the ideal role of the PA who, having an education and understanding of the dynamics of HIV infection and being an integral part of the medical team, is one of support to other health professions as well as being supported by other professionals.

Allied Health Personnel

Allied health personnel have a number of responsibilities that are directly related to the HIV epidemic. Respiratory therapists, for example, are concerned with infection control training on AIDS-related diagnostic procedures that they administer as well as ventilator and oxygen management of patients with HIV-infection. Dental hygienists are concerned with infection control and AIDS-related treatment and prevention techniques. Nutritionists are concerned with protocols for managing HIV-associated opportunistic infections, in understanding drug-nutrient interactions, weight maintenance interventions, and in selection and administration of tube feedings for hospital and home use. They are all very concerned about the potential impact that working with AIDS patients will have on their work and their families.

Public Health Personnel

Increasing responsibility for HIV/AIDS will fall on the public health agencies. Public health personnel will be responsible for acute, long-term and hospice care, especially for the medically indigent. They will also be responsible for financing, evaluation, and the collection of epidemiological data. Many of these personnel are not fully prepared to deal with these issues. Therefore, the Bureau of Health Professions is developing prototype HIV/AIDS continuing education programs for public health professionals.

How the Problem is Being Addressed

Since 1983 AIDS has been one of the highest priorities of the U.S. Department of Health and Human Services (DHHS). The problems associated with HIV/AIDS are particularly difficult to resolve because of the perception of possible infection from HIV carriers, the consequent severely debilitating disease ending in painful death, the already prejudicial attitudes towards the two groups most notably affected - male homosexuals and intravenous drug abusers--and ignorance coupled with misinformation due to a lack of convincing, authoritative information that can counteract the mythology. Such a situation is not easily rectified. Various agencies of the Department of Health and Human Services are mounting programs aimed at addressing the multiplicity of problems associated with AIDS.

Strenuous efforts by the Federal government, academia and the pharmaceutical industry, have resulted in the development of a number of therapies, such as AZT, dextran sulfate, aerosolized pentamidine, alpha interferon and others that have been shown to be efficacious in the treatment of HIV infection and its complications, but no cures have been developed. At present, the only effective way to prevent transmission and thereby contain HIV-infection, is education. Early on, it was shown that an intensive educational effort could bring positive results. One program aimed at homosexual men in San Francisco was successful in promoting behavioral change, i.e., "safe sex," and resulted in a significant decline in new HIV-infection rates. This program has been expanded nation-wide. Programs to educate intravenous (IV) drug abusers have had a smaller degree of success because this high risk group is extremely difficult to reach. Many teenagers, have already abandoned the formal educational system. The illicit nature of drug use, the criminal activities associated with it, and distrust of authority combine to create an alienated drug subculture.

Blacks and Hispanics suffer a disproportionate share of the disease and, for preventive programs to be effective, they must take into consideration race, gender, ethnicity, and socioeconomic status. The U.S. Public Health Service (PHS) has conducted a conference on AIDS in minority populations in order to define the specific problems associated with minorities and to develop properly focused and relevant programs.

Specific Programs

Education does make a difference. Data collected in the National Health Interview Survey (NHIS) highlighted the educational differential in those reported reading pamphlets and other literature or seeing or hearing public service announcements about AIDS. The higher the educational level, the more people had read, understood, and felt that what they had learned would be beneficial to them Except for Black adults over 50 years of age, both Blacks and Whites with high school or higher education scored substantially higher on a general knowledge questionnaire about HIV and AIDS then those who had not graduated from high school.

Many types of programs have been developed to meet the various needs of the AIDS and non-AIDS public. The Centers for Disease Control (CDC) has established a National AIDS Information Education Program that distributes public service announcements and other messages, often by well known personalities, on television and radio aimed at all risk groups, but especially at children, teenagers, and IV drug users. It supports the training of professionals who transmit AIDS information to other health care professionals and workers. Prevention information programs directed at IV drug users and their sexual partners offer counseling and testing.

The National Institute on Drug Abuse (NIDA) conducts a program on HIV information and counseling for drug abuse treatment personnel that has trained about 3,000 people. The NIDA provides on-site technical assistance and advice to over 500 agencies. It also conducts communications workshops to assist local drug abuse prevention and public health units in implementing education programs. The NIDA also targets information and education towards specific risk groups, e.g., Blacks, Hispanics, and sponsors meetings with the leaders of these groups.

The National Institute of Mental Health (NIMH) is supporting training on the neuropsychiatric and psychosocial aspects of HIV infection/AIDS. Trainees include medical students, psychiatry and primary care residents, staff physicians, psychologists, nurses, social workers, counselors, and others. To date, over 15,000 people including police and clergy, have received some training. NIMH is working with HRSA to integrate training on the mental health aspects of HIV infection/AIDS into Health Education and Training Centers (HETCs). These centers are responsible for providing education and training programs for health professionals caring for HIV infected persons and patients with AIDS in selected geographic areas of need. They collaborate with area health education centers (AHECs), community-based AIDS organizations, medical and health professions schools, professional societies, hospitals, and other AIDS education and training or service activities in their area (federally and non-federally supported programs) in order to share information and educational materials, and exchange ideas for training. Co-sponsoring of AIDS seminars, workshops, and other training sessions by different entities with a common objective is another means for lowering costs and eliminating duplication of effort, as well as reaching a wider audience.

Information and education on HIV infection is a critical public health imperative. If the expected 40 per cent of the 1 to 1.5 million HIV-infected develop AIDS over the next 8 years, the disease will continue to move up the list of leading causes of death in the United States. In a democratic society, the only way presently known to halt the transmission of HIV is through education and dissemination of information that will convince those practicing high risk behavior to change their lifestyles and to encourage people already infected not to endanger other people. In addition, people not at risk must be convinced not to alter their own lifestyles adversely.

The U.S. Public Health Service is conducting an extensive media campaign ("American Responds to AIDS") and has instituted a National AIDS Hotline. Also, the CDC has established a National Clearinghouse for AIDS Information. It also conducts periodic review conferences to assess new data and scientific information about HIV/AIDS (DHHS, 1988). An HIV/AIDS information pamphlet has been sent out to every listed household in the United States. The PHS also provides technical assistance and funding assistance and teacher HIV/AIDS information training to States and local communities with high incidence rates. The PHS cooperates extensively with State and local health departments by providing funding assistance and technical and education programs as well as outreach demonstration projects for comprehensive, cost-effective care and support systems for people with AIDS.

In response to an ever-widening need to deal with the AIDS problem, new programs will continue to be developed. The costs of HIV/AIDS are staggering, not only in human terms, but in the projected drain on the Nation's funding resources. Based on the work of Scitovsky and Rice, it has been estimated that medical costs to keep one AIDS patient alive during 1992 will range from $30,000-$475,000 (DHHS, 1988). Based on CDC projections of increasing numbers of AIDS patients, the total annual cost by 1991 may well be in the $2 to 8 billion range (Arno et al, 1989; Hellinger, 1988).

The HIV/AIDS problem presents a formidable challenge to our Nation's health professionals. Considering all the programs that have been initiated to address the problem since it was first identified less than 10 years ago, the response has been noteworthy. But much more needs to be done in view of the expected accelerating growth of the disease.

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Substance Abuse

The abuse of alcohol and other drugs is a major public health problem in the United States. The total cost of health and social problems caused by this abuse, from lost wages and lowered productivity, exceeds $200 billion, nearly 5 per cent of the gross national product. Of this amount, alcoholism costs $150 billion and drug abuse nearly $60 billion (Mosher, 1988; Des Jarlais, 1988).

Moreover, substance abuse is a causal factor in other severe health and social problems. It is estimated that over 50 per cent of traffic accidents are caused by substance abuse. The risk of direct transmission of the human immune deficiency virus (HIV) through sharing contaminated needles and through damaged immune systems and high risk sexual behavior, is greatly increased by substance abuse. Pregnant women abusers are at greater risk of complications and higher rates of infant and maternal mortality than non-abusers. Adolescent substance abusers are more likely to fail at school, become pregnant if female, and engage in destructive behavior as delinquents.

The adverse consequences of substance abuse, are therefore, numerous and severe. Particularly unfortunate is that abusers tend to be younger than the general population and therefore generate excessive amounts of lost years of productive life through pursuit of this highly risky and destructive addiction. Although the use of some illicit drugs by adolescents has appeared to decline in recent years from the peak in the late 1970s, cocaine use has increased, especially the inexpensive and potent form of "crack" cocaine. And, unfortunately, new and powerful drugs are developed all the time. The latest is a crystalline methamphetamine (street name--ice) made in Asia and shipped to Hawaii, that appears to have devastating effects on users. Alcohol abuse continues to be high among adolescents and males under 25 years of age, causing thousands of deaths each year in this age group from motor vehicle accidents.

A large number of people are under treatment for substance abuse. According to a recent survey there were a 614,123 individuals in treatment on October 30, 1987 (National Institute on Drug Abuse, 1989). Of these, 43 per cent were being treated for drug abuse and 57 per cent for alcoholism. Over 10 per cent of all treatment clients were under 18 years of age and nearly two-thirds were under 35 years. The total unduplicated number of clients treated in the 12-month period ending October 30, 1987 was 2.3 million. This is a heavy use of health care and social services.

Substance abuse is a disease that afflicts individuals regardless of age, race, gender, education, or socioeconomic status. Its physical and psychological damage shortens life expectancy and lowers the quality of life. The prevention, diagnosis, and treatment of substance abuse are important to everyone. Particularly vulnerable are the inner-city poor and young people and other minorities. Minority health care personnel and other culturally knowledgeable people need to be trained in intervention and prevention education programs.

Historically, substance abuse has been viewed by society as criminal behavior or, at best, loss of control. In recent years society in general and health professionals in particular have come to recognize that addiction to alcohol and other chemicals is largely a chronic and treatable disease. Substance abuse and mental health problems often coexist in the same person. At present, the only mental health professionals trained specifically to address substance abuse are certified alcoholism counselors whose focus is on treatment. Health professionals have been asked by society to provide direction in the prevention, diagnosis, and treatment of substance abuse. Serving in a multidisciplinary capacity health professionals can provide important services in prevention programs, identification of substance abuse problems, referral, counseling, and therapy. As greater attention is given to alleviation of the problem of substance abuse, the role of health professionals has expanded and educational activities to prepare for this role have intensified.

In recognition of the importance of the substance abuse problem the Public Health Service has implemented a plan to reduce the demand for illicit drugs. The plan emphasizes a coordinated approach between the Public Health Service and the private sector to improve practitioners' skills in preventing, diagnosing, and treating substance abuse. The Service's Office of Substance Abuse Prevention is supporting a Health Professions Primary Care Task Force to identify existing health constituency organization, programs, and educational materials and recommend methods of improving professionals awareness of alcohol and other drug abuse problems. The Bureau of Health Professions has been organizing consortia of a broad spectrum of health professional groups to address the problem of substance abuse. Specifically, the Bureau of Health Profession's Divisions of Medicine, Nursing and Dental and Associated Health are collaborating with appropriate educational institutions and specialty organizations.

Physicians

A number of activities have focused on substance abuse curriculum development in Departments of Family Medicine. These activities were a funding priority of the Bureau of Health Professions in 1981, and many of the projects continue to emphasize the substance abuse area. The continuing concern to provide physicians, especially primary care physicians, with exposure to curricula on substance abuse was revealed recently by a survey conducted in 98 medical schools and 1,124 presidency programs. The survey showed that 70 per cent of the medical schools and 58 per cent of the residency programs reported offering at least one curriculum unit on substance abuse (Davis, 1988).

The Office of Substance Abuse Prevention (OSAP) of the Alcohol, Drug Abuse, and Mental Health Administration has planned a National Training System that will emphasize development of prevention, intervention and treatment training models for physicians and other health professions. With training, primary care physicians, such as pediatricians and obstetricians, are in a position to provide effective early intervention against substance abuse.

Increasingly, medical specialty groups are identifying substance abuse as a critical public health problem. These groups are mailing information to members and are developing continuing medical education curricula. Assistance in these activities has been provided by the Division of Medicine of the Bureau of Health Professions, the Alcohol, Drug Abuse and Mental Health Administration, and the American Medical Association.

Public Health Personnel

Federal, State and local public health personnel will be increasingly involved in public education and in planning, implementing, and evaluating substance abuse programs. Most of these personnel are not adequately trained for this purpose. Continuing education activities will need to be developed.

Nurses

Nurse midwives, nurse practitioners, and clinical nurse specialists in primary care nursing and in community nursing routinely provide prevention, detection, referral for treatment, and education services to their clients. Nurse midwifery curricula emphasize the deleterious effects of substance abuse in the antepartum, intrapartum, and postpartum periods by stressing that substance abuse is harmful to the fetus, to the newly born infant, and to the mother. Nearly all graduate programs in primary and community nursing include content on substance abuse. Nurse practitioners contribute to the surveillance, identification, and referral of people who are abusing alcohol. School nurse practitioners are particularly focused on prevention of substance abuse.

Estimates of numbers of nurses employed in the direct treatment of substance abusers (drugs and alcohol) are not currently available. However, the Drug and Alcohol Nurses' Association, Inc. lists over 600 nurse members who specialize in the care of people with alcohol and drug abuse problems.

Educational opportunities for nurses to learn about the care of people with substance abuse problems are either provided by continuing education programs or through graduate education. Regardless of method, however, these opportunities are limited. The majority of offerings are through continuing education. The American Nurses' Association offers continuing education programs during its biennial meetings. The Drug and Alcohol Nurses' Association, Inc. sponsors regional conferences and national meetings for members who work with alcohol and drug abuse patients. The National Institute on Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism, recognizing the gap in nursing education, recently held a consensus development conference on the integration of alcohol and drug abuse knowledge into undergraduate nursing curricula.

Formal opportunities within schools of nursing to prepare nurses to care for people with substance abuse are also limited. Although both undergraduate and graduate students may negotiate for clinical placements in substance abuse centers, there are only three graduate programs in nursing in the United States that offer this major. For nurses who are themselves substance abuses, programs sponsored by the American Nurses Association are available.

Dentistry

The American Dental Association (ADA) has been addressing the problem of chemical dependency through local dental society programs since the 1970s. Today, 40 constituent and 35 component societies offer chemical dependency assistance programs. In 1985 the Advisory Committee on Chemical Dependency Issues (ACCDI) was formed and members of this committee planned and participated in a scientific program on chemical dependency at the ADA annual session in October 1986. The First National Conference on Alcohol and Chemical Dependency in the Dental Profession was held in July 1985 to discuss basic issues in alcohol and chemical dependency. The First ADA Policy Statement on Chemical Dependency agreed that chemical dependency is a disease and should be treated as such. It committed ADA to help its addicted members. It further encouraged dental schools to add chemical dependency course work to their curricula. The Second National Conference on Chemical Dependency in the Dental Profession, convened on August 31 -September 1, 1987, focused on family aspects of substance abuse.

In May of 1987 the Commission of Dental Accreditation informed all dental school deans that the Commission encourages dental schools to allocate time in the predoctoral and postdoctoral curricula for presentation of content concerning substance use, misuse, and addiction including current knowledge of chemical addiction as a disease, understanding addictiveness, early warning signs, and effective treatment approaches. In response, the ADA Council on Dental Practice recommended that the Council on Dental Education, the American Association of Dental Schools (AADS), and other appropriate agencies should develop a model dental school curriculum on chemical dependency.

Physician Assistants

Physician assistants (PAs) are playing important roles in caring for chemically dependent individuals. Their patient care functions include detection, intervention, and referral for appropriate treatment and direct care provided in ambulatory and hospital based settings. Many hospitals utilize special clinical units for alcohol and other substance addicted patients. For the patient in a psychiatric ward, particularly one with a drug dependency problem, the PA is a resource for primary care and can assist in group therapy under the supervision of a psychiatrist. In Department of Veterans Affairs and other hospitals the mental health team often prefers that the physical care of the patients be handled by a practitioner who is stationed on the unit, but is not directly involved in psychotherapeutic activities with the patients. PAs often fill that role. The primary task of PAs who work in hospital emergency rooms is to recognize severe drug reactions and overdoses in patients. In all of these settings the PA is able to provide health education while conducting clinical tasks (Cawley, 1987).

Members of the PA profession recognize that the stress of training, pressures of clinical practice and accessibility of controlled substances place all clinicians at risk of chemical dependency. In response, the AAPA has coordinated a national effort to address the problem of substance abuse in the PA ranks. In 1987, the Academy formed a Task Force on the Impaired Practitioner. This program helps to bring PAs with substance abuse problems to treatment and assists the non-addicted PA to understand the nature of drug dependency (Mott, 1987).

Others

The pervasiveness of substance abuse within society affecting even children requires that health personnel and health educators give training and guidance not only to school nurses and police, but others who have contact and an interest in school children such as teachers and possibly even his drivers. Essentially, substance abuse is a problem of all society that ideally should have everyone's attention with the knowledge that, in some way, it affects everyone--bar none.

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Access to Health Care: Issues and Concerns

Ensuring "access" to health services is a major objective of health policy in the United States (Butler, 1989). However, "access" is difficult to define and to measure operationally. According to the U.S. House of Representatives' Discursive Dictionary of Health Care, "access" refers to an individual's (or group's) "ability" to obtain needed health services. Access has geographic, cultural, language, financial, social, ethnic, and psychic components. Access is a function of the availability of health services and their acceptability. This definition is consistent with the statement that accessibility is the ability to reach, obtain, or afford entrance to services (Parker, 1974).

Since the 1960s access to and availability of medical care has improved. Studies report that nearly all Americans are now within 30 minutes of medical services. Both Medicare and Medicaid have substantially reduced the financial barriers to care. Black-White differences in the use of virtually all types of health services also have narrowed although differences in the quality of care received are considerable. In 1963 the proportion of Blacks who saw a physician was 18 percent lower than for Whites; by 1982 this differential was almost eliminated. The proportion of pregnant Black women who received prenatal care during the first trimester increased from 42 percent in 1969 to 62 percent in 1985 (Blendon et al., 1988).

Improvements in access have been accompanied by improved health outcomes. For example, the infant mortality rate in 1987 was half the 1970 rate of 20 deaths per 1,000 live births. The very high rate for Blacks has been reduced from nearly 33 to 18 deaths per 1,000 live births, but it is still twice that for Whites (DHHS, 1989). Life expectancy for Blacks is six years fewer than for Whites although the gap has been narrowed by 1 1/2 years since 1970.

Despite improvements there remain several significant concerns about segments of the population that still face barriers to access: the uninsured, the disadvantaged, and those poor who live in urban and rural areas. The overall gains during the past two decades should not mask the remaining problems in access to and use of health care and the quality of care. There are still people, estimated at 10 to 15 percent of the U.S. population, without access to appropriate health care. As has been indicated substantial differences in health status remain between Blacks and Whites.

Problem Areas in Access to Health Care

Uninsured Americans

Despite introduction of Medicare and Medicaid about 25 million people were uninsured at any one point in the 1970s. This number has increased to an estimated 32 million today. Over one-half of the uninsured are employed, most have low incomes, and one third are under 18 years of age. A relatively larger share of these individuals are in poorer health than those with insurance, yet have fewer physician visits. Minorities are disproportionately represented among the uninsured (about 22 percent of the total) as are rural individuals. Rural residents, as a group, have a 15 percent higher rate of uninsuredness than the U.S. average and a 24 percent higher rate than their metropolitan counterparts. (Himmelstein and Woolhander, 1984; Butler, 1989). Medicaid, the Federal/State program for the poor, provides health insurance for some of the employed, but coverage varies by state. Overall, Medicaid reaches fewer than half of the poor and fewer of the employed poor.

Over the past few years children have been adversely affected by the employer-based insurance system. One in four children is part of a single parent family and may not have access to insurance through the employer system. Single parents who were never married earn one-half to one-third the income of the average wage earner. As a result, a growing proportion of children live in families with no or little earned income and are uninsured (Lewis-Idema, 1989).

Any change in access to care for the medically indigent by improving their financial status is likely to increase demand for services. Availability of physician services as well as the services of other health care providers may not be adequate to meet this potential demand. Conversely, increasing the availability of services for the medically indigent without lowering financial barriers to care may not necessarily improve access.

Disadvantaged Americans

Even though most Americans over the past two decades reported having access to a regular source of health care, a 1986 survey found that 18 percent reported having no single source of care. Four years earlier 11 percent lacked a single care source. The poor reported having 27 percent fewer physician visits than the nonpoor of the same health status. Blacks at all income levels had fewer physician visits. In addition, minorities continue to receive less hospital care than might be appropriate given their higher rates of ill health (Freeman et al., 1987). Among vulnerable groups 18.5 percent of persons with chronic illness had not even one physician visit in the previous year and 15 percent of pregnant women had no prenatal care in their first trimester (Butler, 1989).

Blacks, on average, are in poorer health than Whites, which may be a consequence of a lack of access to medical care as well as a generally lower standard of living, as reflected by differences in average incomes and other indicators of socioeconomic status. Black

Americans continue to have a 50 percent higher death rate than Whites and their infant mortality rate is twice that of Whites. Consequently, if there were real parity in access to medical care between the two racial groups, there would undoubtedly be a substantially higher use of health services among Black Americans (Blendon et al., 1988).

Not only is access to care a problem for many minority Americans, but there is some evidence that gives rise to questions about the quality of their health care (Roper and Hackbarth, 1988). A 1986 access survey found that most White Americans were highly satisfied with their physician and inpatient hospital care; Blacks reported less satisfaction with care received in hospitalizations and ambulatory visits (Freeman et al., 1987).

Minority populations also experience cultural, attitudinal, and other nonfinancial barriers that impede access to medical care. When steps to remove financial barriers are enacted, the relative importance of the other factors may be revealed (Butler, 1989). One factor, language barriers, has received more attention in recent years. The steady growth in Hispanic and Asian populations over the past decade has resulted in the need for greater consideration of communication barriers. It has been estimated that more than 60 percent of Asian Americans are recent immigrants (DHHS, 1985) and the Hispanic population is estimated to have increased by 4.3 million persons, 30 percent, in the period from 1980 to 1987 alone (U.S. Bureau of Census, 1988). Yet few health care service settings are staffed with bilingual personnel, a situation that contributes to the inaccessibility of health care services to a substantial number of non-English speaking persons.

After reviewing the literature and convening public hearings, the Council on Graduate Medical Education (COGME) concluded that greater participation of underrepresented minorities in medicine is vitally important to increasing availability of providers and access of minority populations to health care as well as to ensuring that minorities have equal access to a career in medicine. The availability of well-trained health care providers for minority groups may be crucial in reducing disparities in overall health status. Many studies have found that health professionals from the same cultural background, are better able to communicate with their patients and thus have a positive influence on health outcomes (DHHS, 1988b).

Inner City and Rural Hospital Staffing

Access to health care, particularly for the underserved in inner cities, could be adversely affected by cutbacks in manpower availability such as reduction in resident hours or reduced support for residency training of foreign medical graduates (FMGs). Some FMG-dependent hospitals, those with 10 or more residents of whom 25 percent or more are FMGs, serve an economically disadvantaged central city population as measured by the proportion of patients on Medicaid (DHHS, 1988b).

Staffing of hospitals in remote rural areas presents yet a different access problem. Payments to rural hospitals from Medicare and other third party payors have been lower for comparable services than to urban hospitals and have had an impact on the viability of many rural hospitals that are the only source of care for many Americans. With the underutilization of bed capacity and without alternative uses for these beds, many rural hospitals have had severe financial problems (Butler, 1989). These problems are compounded by difficulties in recruiting and retaining health professionals.

Malpractice and Obstetrics

The effect of the medical liability situation on access to health care in rural areas, particularly maternity care, has been especially serious. The majority of physicians who have discontinued obstetric practice in rural areas have been general practitioners and family physicians -- the primary providers of health care for rural women. In Utah more than half of the general and family physicians have stopped practicing obstetrics (ACOG, 1988). In many states entire counties are without providers of obstetric care; e.g., 67 counties in Georgia, 28 in Alabama and 19 in Colorado. Rural medically indigent women and those dependent on Medicaid have often been the most severely affected; i.e., many obstetrical providers have limited the amount of care to this group as a means of limiting liability (Rosenblatt, 1988).

Health Personnel and Access Problems

Physicians

Physician availability in small rural counties (i.e., counties with populations less than 10,000) between 1975 and 1985 increased at a slower rate than for the nation as a whole. Currently, the average is 53 physicians/100,000 population in these counties, approximately one-third the U.S. average of 163 physicians/100,000 population (Kindig and Movassaghi, 1987).

Nurses

Many rural areas also have difficulties recruiting and retaining registered nurses. Thirty-seven percent of rural hospitals with fewer than 50 beds had R.N. vacancy rates of 15 percent or more in 1987 (AHA, 1987). Although the numbers of registered nurses needed for rural facilities may be small, the lack of these nurses is extremely critical -- in a rural hospital the lack of even one or two nurses may seriously affect the ability of the hospital to provide care.

Provision of primary or entry level care in rural areas is also affected by the nursing shortage. Public/community health nurses, nurse practitioners and certified nurse midwives form a significant proportion of entry level care for many rural residents. In some states, turnover in community/public health nursing is increasing as nurses leave community settings to work in hospitals for higher salaries (DHHS, 1988c).

Physician Assistants (PAs)

Physician assistants have the potential to improve access for people in remote areas because they are more evenly distributed within the population than other primary care professionals. PAs are also practicing in increasing numbers in urban shortage areas in hospital settings. Moreover, recruitment of PAs in the armed forces, Bureau of Prisons, and Indian Health Service will likely improve access for special populations that have a history of access problems (APAP, 1988).

Dentists

Data show that there is much need for improvement in oral health (Davies, 1985). Access to dental care is inhibited by financial considerations. Over half of the U.S. population lack oral health insurance. Only a small proportion of Medicaid-eligible individuals receive oral health care. Socioeconomic data indicate that the poor, unemployed, homeless, and new immigrant groups not only have the least opportunity for access to oral health services, but also have the greatest need for care. Also, provision of oral health care for special populations - handicapped, medically compromised, and institutionalized patients - is limited. The entire spectrum of oral health needs of these populations must be addressed.

Allied Health Personnel

A substantial disparity exists between employment of allied health personnel in rural or non-metropolitan settings and their employment in metropolitan areas. The number of allied health personnel per 100,000 population in specific disciplines such as dietetics, speech therapy, respiratory therapy, radiologic technology, physical therapy, and occupational therapy is one-half to three-fourths that of metropolitan areas.

Lower concentration of allied health personnel in rural areas may be due to fewer practitioners and institutions that usually employ allied health personnel. Also, allied health education occurs primarily in metropolitan areas. Graduates are often drawn to settings similar to where their clinical experience was provided. They are also attracted to acute care settings with the patient volume needed to support state-of-the-art high technology services. Rural facilities are often perceived as isolated and lacking in this technology.

Pharmacists

Pharmacists are fairly evenly distributed according to population in both urban and rural environments. In rural areas the community pharmacy is often the only source of access to a health care provider. With the closing of many rural hospitals and relocation of primary care providers to metropolitan areas, maintaining pharmacists in rural areas is increasingly important.

Pharmacists in rural areas provide services that are beneficial to the health climate of rural America. The pharmacist counsels on over-the-counter medications and recommends when to seek care from a physician, dentist, or other primary care provider. The pharmacist often serves as intermediary between the patient and a provider who may be located miles away.

Mental Health Personnel

Access to mental health services in rural areas is also a concern. Although the supply of mental health personnel varies greatly, in general, both fewer services and fewer mental health professionals (psychiatrists, psychologists, social workers and psychiatric/mental health nurses) are available in rural areas. Data from 1983 revealed that almost 80 percent of the 2,034 rural counties in the U.S. had neither a psychiatrist or Ph.D. psychologist (DHHS, 1988a). The stability of rural hospitals will also affect access in that 39.3 percent of the combined psychiatry and psychology personnel in rural areas is hospital-based, compared to only 18 percent for the country as a whole.

Federal Programs to Improve Availability of Providers

National Health Service Corps

An increasing number of physicians has improved medical service availability in smaller communities. However, it should be emphasized that increased availability does not assure increased access. Geographic diffusion has not improved the situation in shortage areas that are economically deprived such as remote rural areas and inner-city locations. Many rural and urban areas are unattractive to physicians and other providers for professional, economic, and lifestyle reasons (DHHS, 1988a). Younger physicians are not being drawn into rural practices; the average age of primary care physicians in rural areas is going up. Furthermore, although the number of primary care physicians needed to locate in Health Manpower Shortage Areas (HMSAs) to remove their designations has dropped over time, the decline has slowed significantly in the last 4 years.

The majority or HMSAs are in rural areas -- of the 1,914 primary care HMSAs designated as of June 1988, 1,275 (67 percent) are in non-metropolitan areas. Of the primary care shortage areas classified as experiencing the highest need, 63 percent are located in rural areas.

Neither the growing number of physicians nor the National Health Service Corps (NHSC) placement program has made an appreciable dent in the number of shortage areas (table III-F-1). The number of shortage areas in 1988 is larger than in 1984 even though about half of National Health Service Corps physicians continue to serve in areas short of doctors after fulfilling their obligations (DHHS, 1988a).

Table III-F-1

Shortage Areas 1984-1988

YEAR	SHORTAGE AREAS	UNSERVED POPULATION (in millions)	PHYSICIANS NEEDED
1984	1,836	14.1	4,525
1986	1,949	13.4	4,314
1988	1,931	12.8	4,139

For years the NHSC has served as a staffing resource for a national network of community and migrant health centers (C/MHCs) by assigning its scholarship-obligated practitioners to those sites. These centers form viable systems of care delivery in the most economically depressed areas. Now clinics must recruit other practitioners to meet staffing needs as the field strength of the NHSC has dwindled from over 3,000 health professionals in 1986 to an estimated 1,460 in 1990. Only 200 newly trained obligated physicians were available for placement in 1989 and in 1990 there will be 75 or fewer.

In an effort to fill the void created by the declining NHSC program, the Department of Health and Human Services has proceeded on several fronts. There has been established a loan repayment program at Federal/State levels to aid in recruitment. Approximately 300 physician and 200 nurse positions are scheduled to be filled by the end of 1989. To the extent that the neediest areas cannot attract personnel even with loan repayment, the Department supports flexibility to use some recruitment funds for scholarships. The C/MHC Recruitment and Retention Program enables the development of local initiatives to achieve optimal staffing by devising more competitive employment practices.

Allied Health Education Centers

As a policy tool for improved access the Area Health Education Center (AHEC) national network has been effective in inducing physicians to practice in HMSAs and/or to practice primary care. Originally designed to train providers to improve access in rural areas, AHECs in urban communities in partnerships with C/MHCs are now considered a vehicle for training, recruiting, and retaining providers in inner cities. There have also been successful State and private initiatives in inducing physicians to practice in shortage areas. Notwithstanding these initiatives the number of health manpower shortage areas has not declined because even though some areas lose the HMSA designation other areas gain the designation. Despite improvements in overall physician supply and geographic distribution, a core number of hard-to-fill areas persists.

Health Education and Training Centers

A recent Federal initiative to improve availability of health care personnel is contained in the Health Professions Reauthorization Act of 1988. This law provides authority to support Health Education and Training Centers (HETCs) in order to improve the supply, distribution, quality, and efficiency of health care practitioners in the U.S. who provide health services along the border between the United States and Mexico. It also authorizes support of HETCs in other areas of the country to improve supply, distribution, quality, and efficiency of health care personnel who provide services to any population group that has demonstrated serious unmet health care needs.

Health Care for Rural Areas

The availability of health care in rural areas is also addressed by the Health Professions Reauthorization Act of 1988. Authority is provided in "Health Care for Rural Areas" (Sec. 799A) aid for interdisciplinary training projects designed to use new methods to train health care professionals to provide services in rural areas and to increase recruitment and retention of health care professionals in rural areas, among other purposes. The Nursing Shortage Reduction and Education Extension Act of 1988, authorizes twenty percent of funds for special project grants to be used to increase the nursing supply in rural areas.

In response to the difficulty in recruiting physicians to rural areas and the financial difficulties of rural hospitals, the Omnibus Budget Reconciliation Act of 1987 (P.L. 100-203) authorized the Rural Health Medical Education Demonstration Projects Program. The program is designed to provide primary care residents with clinical rotations in rural hospitals, thereby assisting rural hospitals with staffing.

Other Federal Efforts to Improve Access to Health Care

The Health Resources and Services Administration (HRSA) administers a range of programs for training and providing health care reviews within a broad context of improving access to health care for the medically underserved and unserved.

HRSA has begun a series of national initiatives to increase attention to the medically underserved by States, state-related organizations, communities and private sector groups. In the Spring of 1988, HRSA convened a national invitational conference to identify emerging issues in primary care and directions to be taken to increase supply and improve distribution of properly trained primary care physicians.

Also, HRSA cosponsored with the Robert Wood Johnson Foundation an invitational seminar to identify future roles and responsibilities of public and private sectors in addressing the health care needs of the medically indigent and underserved.

Another illustration of a HRSA cooperative project has been the funding of a project by the National Governors Association to facilitate improvement of State programs for children and pregnant women. This is particularly focused on identifying "best practices" and assisting States in using case management approaches to the care of high risk children.

A combination of activities and programs is needed to improve the health status of Americans generally. The responsibility to achieve this improvement rests with Federal/State/local governments, the private sector, and ultimately and finally, with the individual and family.

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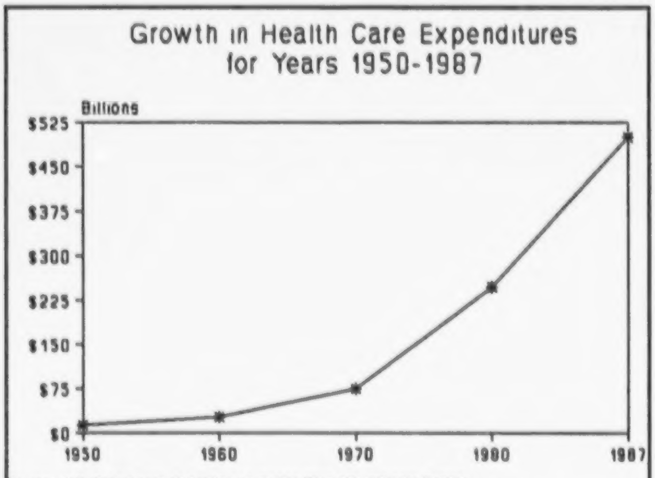
Changing Delivery System

The United States system of health care is undergoing substantial changes in the organization of health services and in the ways in which these services are delivered, utilized, and reimbursed (Merrill and Somers, 1986). A major impetus for these changes has been the rising costs of health care and the efforts to contain them through financing mechanisms. From 1980 to 1988 total expenditures on health care in the United States rose from $248 billion to over one-half trillion dollars, a growth rate averaging 10 per cent per year (Letsch et al., 1988). Exceeding the annual rate of inflation, this rise has placed the United States at the forefront of all the nations of the world in percentage of gross national product spent on health care. In 1986 this percentage was 11.1, two percentage points higher than the next highest nation, Sweden (DHHS, 1989).



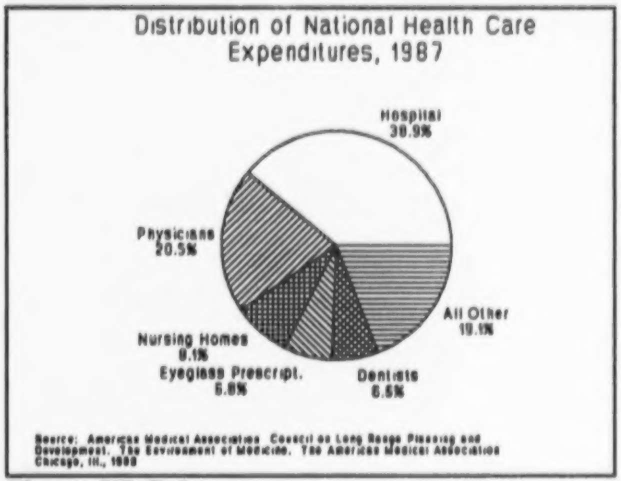
Source: U.S. Department of Health and Human Services, National Center for Health Statistics. Health United States, 1988. DHHS Pub No (PHS) 89-1232. U.S. Government Printing Office, Washington, D.C. March 1989.

Figure III-G-1

Health Care Expenditures

The amount of money spent on health care by this country has been growing at a rapid pace (figure III-G-1). This growth is occurring at the same time that the Federal government, insurance companies, employers, and others are taking steps to try to contain overall health care expenditures. Current expenditures on health care--over one-half trillion dollars or about $2,000 per capita--is more than ten times the amount expended 25 years ago before the adoption of the Medicare program that gave the Federal government an expanded role in financing health care.

The three major categories of health expenditures are hospital care, physician services, and nursing home care (figure III-G-2). Together they account for two-thirds of total expenditures. The proportion of expenditures for hospital care has declined slightly in recent years, from a high of 41 per cent in 1980 to 38.9 per cent in 1987, reflecting efforts to reduce costs of hospital care by earlier discharge of patients and by use of alternative delivery systems that provide care on an outpatient basis.



Source: American Medical Association. Council on Long Range Planning and Development. The Environment of Medicine. The American Medical Association Chicago, Ill., 1988

Figure III-G-2

Projections of health care expenditures show continued increases in the future. The Health Care Financing Administration (HCFA) estimates that, by the year 2000, expenditures will total one and one-half trillion dollars, or three times the current amount (DHHS, 1987). The proportion of gross national product expended on health care is expected to rise to 15 per cent.

A number of factors are responsible for increases in health care expenditures. The single largest factor is inflation. The Health Care Financing Administration (HCFA) estimates that 60 percent of growth in health care expenditures over the past 25 years has been due to inflation (Arnett 1986). Another 30 percent is due to an increase in utilization of services. Increased utilization is due not only to growth in total population, but to increases in the number of elderly, who are high users of health services (see section III-B, Aging Population).

Other increases in health care expenditures are attributable to medical care price increases in excess of general price inflation due primarily to advances in medical technology, facilities, equipment, drugs, and procedures. Technological advances are increasing at a rapid rate and will continue to extert a strong influence on rising health care costs together with increased utilization and inflation.

Sources of financing of the delivery of health care has changed significantly in the past 25 years. In 1965 over half of all health care funds came from direct payments by individuals and one-quarter from private health insurance. Today direct payments are only one-quarter of the total while private health insurance has increased to 30 percent. The largest increase has been in funding by the Federal government - from 13 percent of the total in 1965 to 30 per cent in 1987 (DHHS, 1987).

The Changing Delivery System

The financing of health care influences the way in which health care is organized and services are delivered. In an effort to restrain rising costs of care the financing mechanism has been used to encourage use of less expensive services. Services are provided in a variety of settings: physician's offices, the patient's home, free-standing clinics and health centers, short-stay hospitals, long-term hospitals, and nursing homes (table III-G-1).

There have been significant changes in health care delivery settings in recent years. More care is now being provided in ambulatory care settings and in patients' homes while patient census in hospitals is decreasing. Since 1975 there has been a decline in numbers from over 6,300 short-stay hospitals to approximately 6,000 today, most of the reduction taking place in small rural hospitals. Although the number of hospitals is declining, the number of beds per hospital are increasing because smaller hospitals are closing at a faster rate than larger ones. Consolidation of hospitals has been taking place at a fairly rapid rate as the number of hospitals in multi-hospital systems has been increasing. Although the number of hospitals conducted on a for-profit basis is still growing--an increase of about 100 hospitals in the last 10 years--the rate of growth has slowed.

While the number of hospitals and number of beds have decreased, occupancy rates have also declined from 75 per cent to under 65 per cent during this same period because of falling patient admissions. At the same time there has been a sharp increase in services provided in hospital outpatient departments--over 15 per cent--and in other ambulatory settings such as day surgery centers, emergency centers, birthing centers, and centers to promote health through smoking cessation and weight reduction.

Table III-G-1

Health Care Facilities and Organizations in the United States, 1987

Facility/Organization	Number
Short-stay Hospitals	6,035
Long-term Hospitals	542
General	21
Psychiatric	390
Other	131
Nursing Homes*	16,033
Health Maintenance Organizations**	662
Preferred Provider Organizations**	535
Freestanding Ambulatory Surgery Centers	600***
Freestanding Emergency Centers	3,500***
Home Health Agencies	10,000****

* With 25 beds or more
** Data for 1987
*** Estimated for 1987
**** Approximately 8,000 are certified by HCFA for Medicare patients

Sources: American Medical Association Council on Long Range Planning and Development. The Environment of Medicine. The American Medical Association, Chicago, Ill., 1989.

U.S. Department of Health and Human Services, National Center for Health Statistics Health United States 1988. DHHS Pub. No. (PHS) 89-1232. U.S. Government Printing Office, Washington, D.C.

Home care programs have also expanded as the average length of stay in short-term hospitals has decreased and patients are being discharged with health problems still requiring professional attention. The prospective payment system for patients insured by Medicare has played a major role in shortening lengths of stay in hospitals. Reimbursement is now based on a predetermined amount based on a patient's diagnosis (diagnosis related group), not on length of stay. Just since 1980 the length of stay for Medicare financed patients in short-stay hospitals has declined from 10.6 to 8.7 days (DHHS, 1989). The shortened length of stay has increased the intensity of nursing services required by patients, one of the factors cited as responsible for the current shortage of nurses (DHHS, 1988b).

Group Practice. An important change in the delivery system is the growth of group practice for physicians. The percentage of physicians practicing in group medical practices rather than as solo practitioners has increased to nearly half of all physicians in office-based practice as compared to a little over 30 percent in 1980. In 1987 there were 17,516 groups reported by the American Medical Association (AMA), including Health Maintenance Organizations, Preferred Provider Organizations, and other types of group practices. (AMA, 1989). Growth in group practices has been accompanied by growth in the proportion of physicians employed by others. However, contrary to some predictions, employment of physicians by hospitals has declined in recent years: less than 8 percent of all non-Federal physicians in patient care were employed as full-time hospital staff in 1987.

Among the reasons group practices have grown is the economy of scale achieved when physicians share experience, equipment, and office space. Practicing in groups also enables physicians to pursue predictable work schedules and provides tax and other benefits.

Health Maintenance Organizations. One form of group practice that has proliferated is the health maintenance organization (HMO). HMOs represent a growing type of health care delivery organization, known as "managed health care" (Gabel et al., 1988). HMOs provide health care to enrolled members for a predetermined payment thus combining features of a financing and a delivery system mechanism in contrast to conventional health insurance in which the patient or provider is reimbursed for expenses incurred for specified health services on a fee-for-service basis and the patient selects the source of care. HMO services are provided either by a physician group employed and managed by the organization or by an outside group or groups of physicians known as Independent Practice Associations (IPAs). In 1987 there were 662 HMOs with thirty million enrollees in the United States, over twice as many as the number reported in 1982. The IPA structure is rapidly becoming the most prevalent kind of HMO, 42 per cent of the total number of HMOs in 1988 compared to only 19 per cent four years previously (AMA, 1989).

Somewhat related to HMOs are the rapidly growing Preferred Provider Organizations (PPOs). These are associations that contract with employers and insurers on a negotiated fee-for-service basis to provide services to subscribers who are free to choose any provider for care, paying a somewhat higher deductible and copayment if the provider is outside of the plan (Gabel, 1986; de Lissovoy,1988; Bachman, 1989). A total of 535 PPOs were reported in 1987, a large increase from the 27 in operation in 1981 (AMA, 1989). However, growth in the number of these organizations has slowed in recent years, with a less than 10 per cent annual increase in 1987 compared to an average 83 percent a year during 1981-1986. HMO growth has also slowed to an 11 per cent annual increase in 1987 compared to an average annual growth rate of nearly 25 percent in the preceding 5 years.

The growth of HMOs and other recently developed health care delivery mechanisms is attributable to efforts to contain costs (Enthoven, 1988). The predetermined fixed-payment by subscribers provides incentives for HMOs to become cost-effective as well as insuring greater predictability of health care costs. As managed delivery systems HMOs can provide comprehensive and integrated care to subscribers and are in a strategic position to pursue programs of health promotion and illness prevention that could, in future, reduce health care costs.

There are predictions that HMOs and other fixed-payment systems will continue to expand. One impetus to growth is the entrance of HMOs into the Medicare market under Medicare competition demonstrations. Under these demonstrations HMOs and competitive medical plans (CMPs) such as Preferred Provider Organizations agree to accept financial risk for providing Medicare benefits to enrolled Medicare beneficiaries (Longwell, 1987; Bachman, 1989). One prediction is that by the beginning of the next century more than half the U.S. population will be HMO members (DHHS, 1988a). At the present rate of growth such extensive coverage may be difficult to achieve since in 1987 enrollment in HMOs was less than 30 million persons (AMA, 1989).

Health Personnel in the Changing Delivery System

Growth and diversification of the health care delivery system have, as would be expected, been accompanied by growth in numbers and types of health personnel. According to the U.S. Census Bureau's Current Population Survey an estimated 8.8 million persons were employed in the health care industry in 1988. The health care industry is one of the largest employers and among the most labor intensive of all industries in the U.S. It is also one of the fastest growing, more than doubling in size in the past twenty years. About 7.5 per cent of all employed civilians in the U.S. were in the health service industry in 1987, a rise from 5.5 per cent in 1970 (DHHS, 1989).

About half of all health care personnel in 1987 were employed in hospitals, 16 per cent in nursing homes and 11 per cent in offices of physicians. While the proportion of personnel employed in hospitals has declined somewhat since 1970 from 63 to 53 per cent, the proportions employed in nursing homes and ambulatory care settings such as surgical and emergency centers and in home health programs have been increasing (DHHS, 1989).

The changing delivery system has had a number of important effects on health discussed in separate sections in this chapter and the one that follows, including access to care, availability of primary care, shortage of nurses, and quality assurance. Some of the major effects of delivery system changes on health personnel are summarized as follows:

- *More personnel than ever before are working in ambulatory care settings. The hospital, while still the largest single employer of health personnel, is playing a smaller role as provider of care than in the past, and care is becoming more technologically complex as hospitalized patients are, on average, more acutely ill.*

- *Prospective reimbursement for hospital care has shortened length of stays and has intensified care of patients. The current shortage of nurses is attributed, in part, to intensified needs of patients. Home health programs are now receiving more acutely ill patients, increasing demand for highly skilled nurses and other personnel.*

- *Growth of managed care through such mechanisms as health maintenance organizations has led to more coordination of care, more efficient case management, and a closer working relationship among health personnel providing the care. Managed care also places greater emphasis on health promotion and illness prevention services which may help reduce costs of care.*

- *Technological advances in the changing delivery system require more specialization by health personnel as well as greater need for advanced educational preparation.*

- *The growth, diversification, and complexity of the health care system have raised concerns about the efficiency, effectiveness, efficacy, and equity of services (White, 1973). Health personnel play a key role in assurance and maintenance of quality of services. Their numbers, levels of preparation, and geographic distribution significantly affect quality of care.*

- *Within the changing delivery system with increasing emphasis on high-technology services the need for primary care remains high. Although primary care can help promote preventive behaviors, improve health outcomes, and minimize unnecessary utilization of services, thereby, lowering costs of care, many fewer health personnel provide primary care than are needed. Financing mechanisms favor 'high-tech' rather than primary care, training programs for primary care are inadequately financed, and primary care training in ambulatory settings is inadequately recognized. Clinical training for physicians, nurses, and other health personnel takes place mostly in hospitals.*

- *In spite of improvements in medical care and changes in the delivery system that have made care available by reducing financial barriers to access to care. These include the disadvantaged, those who live in rural areas, and the uninsured. Every health discipline has the potential to improve access to care, but increases in numbers and training and in improvements in geographic distribution will be required.*

- *The recent growth of multi-hospital systems, the increase in group practices, the proliferation of for-profit organizations providing home-care, emergency care, "wellness care" and other forms of services have given rise to the term "corporatization" of the American health care industry. In a pejorative sense this has meant health care being delivered as any other commodity, for economic profit. As critics of this* *development have pointed out it is essential that health professionals not to lose sight of the "caring" and humanistic aspects of health care (Relman, 1983).*

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Quality Assurance and Medical Effectiveness in Medical Practice: Issues and Educational Needs

Desire to moderate increases in health care expenditures without adversely affecting quality of services, increasing interest in developing appropriate and effective procedures and treatments, public demand for identification of practitioners who provide substandard medical care, and concern about costs of medical malpractice contribute to an intensified focus on the quality-costs parameters of the health delivery system.

Quality Assurance

Demand for more aggressive identification and tracking of practitioners who provide substandard care resulted in enactment of the Health Care Quality Improvement Act of 1986 (Title IV, Public Law 99-660). A prominent part of this legislation is establishment of a National Practitioner Data Bank (the Bank).

The Bank is being established through a 5-year contract with Unisys Corporation and will be monitored by the Division of Quality Assurance and Liability Management, Bureau of Health Professions. It will receive and release information on: (1) payments made for the benefit of physicians, dentists, and other health care practitioners as a result of medical malpractice actions or claims; (2) licensure disciplinary actions taken by state medical and dental boards; (3) professional review actions taken by health care entities, such as hospitals or health maintenance organizations, which adversely affect the clinical privileges of a physician or dentist for more than 30 days if the actions are based on peer review of the practitioner's professional competence or conduct; and (4) adverse actions on physicians and dentists' membership taken by professional societies. In addition, the Medicare and Medicaid Patient and Program Protection Act of 1987 (section 5, P.L. 100-93) expands the Bank's information base to include adverse licensure actions involving all licensed health practitioners and care entities. The Bank's anticipated opening date is spring 1990.

Title IV also encourages professional peer review because such activity is a cornerstone of quality assurance. Under the Act, professional review bodies of health care entities such as hospitals and health maintenance organizations and persons serving on or otherwise assisting such bodies are offered immunity from civil suit, under State or Federal law, if their professional peer review activities are conducted in good faith with proper regard for due process in the furtherance of quality of care. It is hoped that protections offered by the Act will encourage peer review bodies to conduct their activities thoughtfully without fear of legal suit.

Licensure and discipline of health care professionals traditionally have been and continue to be a State responsibility. Formal disciplinary activity continues to increase among State Medical Boards. Boards voluntarily report disciplinary actions to the Federation of State Medical Boards, and for 1986, the most recent year for which complete information is available, such actions totaled 2,302, including 458 revocations. This total represents a 9.2 percent increase from the 1985 total of 2,108 (Galusha, 1988). This figure provides one of the few nationally available baseline statistics against which data received by the National Practitioner Data Bank can be measured. Since 1987, virtually all States have enacted some form of legislation that strengthens State oversight and monitoring of physician behavior. In Florida and Maryland such laws have included financial support for substantial reorganization of the licensure and disciplinary functions. States are paying new attention to the problem of the impaired physician and looking for strategies, for example, to rehabilitate physicians identified as alcohol or drug abusers. Many States have also amended their peer review laws, in most cases granting immunity to participants in the process and also to peer review informants (Intergovernmental Health Policy Project, 1988).

Increased State oversight is not limited to physicians alone. States are now subjecting previously not explicitly regulated health practitioners to explicit regulation. For example, several States have begun regulating radiation therapy and nuclear therapy technologists and other States are in the process of developing such regulations (CLEAR and COGME, 1988).

Efforts to improve health care quality should lead to a reduction in incidents of substandard care. While concern over reducing occurrences of medical malpractice has been characteristic of the 1980s, there is little authoritative information available to document the frequency with which adverse medical events occur and how often such events are attributable to negligence. The cost of medical malpractice insurance for both health care professionals and institutions has increased throughout the decade, both in absolute terms and as a percentage of total health care costs. Availability of insurance, with a few notable exceptions, has not been a problem as it had been in the 1970s. It is commonly reported that fear of medical liability has led to the practice of defensive medicine. Although definitions and cost estimates of defensive medicine vary, the American Medical Association put the cost of "practice changes in response to increased claims risk" at $10.6 billion annually. The Health Care Financing Administration (HCFA), using an earlier estimate of the volume of defensive medicine of $10.2 billion, calculated the cost to the Medicare program of defensive medicine in Fiscal Year 1987 to be $2.5 billion (DHHS, 1987).

Costs associated with medical liability may be affecting access to health care. A 1986 study prepared for the U.S. Public Health Service identified more than 150 examples of purported barriers to access in 26 States with a greater likelihood of impairment in midwestern and southeastern states and rural areas and among low-income patients (Jakulski et al, 1986). There are frequent reports of practice changes attributed to the costs, both financial and psychological, of dealing with medical liability. Reports of physicians modifying or abandoning their practices are most frequent in the area of obstetrical care, whose malpractice insurance premiums have increased disproportionately when compared to those of other specialists (DHHS, 1987). In 1988 the American College of Obstetricians and Gynecologists reported from a survey of its membership that 41 percent of respondents reported that they have made some change in their practice as a result of risk of malpractice. These changes included limiting the amount of high risk obstetrical care, decreasing the number of deliveries and, for 12.4 percent of respondents, stopping the practice of obstetrics (ACOG, 1988).

During the 1980s most States addressed tort reform. Many enacted provisions associated with the reduction of medical malpractice claims frequency or severity, such as shortening the statute of limitations, modifying the collateral source rule, and limiting the amount of damages (DHHS, 1987). Recently, some States have enacted laws specifically aimed at assuring availability of obstetrical care. Strategies include subsidies to rural obstetricians (Hawaii SB S1-86, enacted July 1987). Two States have gone further, enacting no-fault liability funds for certain birth-related neurological injuries (Virginia, Va. Code Sec. 38.2-5000 et seq., enacted February 1987 and Florida HB 819, enacted February 1988). In the absence of State legislation, sub-State units of government have taken measures to help assure availability of obstetricians to provide services to indigent patients. Montgomery County, Maryland, for example, established a mechanism to eliminate an obstetrician's personal risk of liability in delivering care to a County patient by hiring the obstetricians as temporary County employees. (Wasserman, 1988.)

Medical Effectiveness

The Department is markedly expanding its science-based research program intended to improve the quality of health care. This effort should reduce health care costs by eliminating unnecessary and inappropriate health care services. Major components to the Department's medical treatment effectiveness are:

- o *Significant expansion of research on patient outcomes and clinical effectiveness;*
- o *Expanded collection, development, and analysis of clinical and claims data; and*
- o *Dissemination of research findings and data analysis.*

Research findings will be transferred to practitioners through professional organizations and journal publications, public education, and by integration of findings into medical education. Medical school faculties, which both train new physicians and provide continuing education to practicing providers and academicians, comprise an important audience for the findings of patient outcomes research (Eichorn, 1986).

Cost

Continuing growth in health care expenditures at rates higher than the general rate of inflation has resulted in such expenditures representing an increasingly large percentage of the Gross National Product--11.1 percent in 1987. In that year national health expenditures totaled $500.3 billion, a 9.8 percent increase over the previous year (Letsch et al, 1988). Technological advancements in health care increase the ability to prevent or manage disease, but they also raise public expectations, sometimes unrealistically, of what can be accomplished through medical intervention. Expenditures have increased as have concerns that health care resources are used effectively and efficiently.

Implementation of cost control initiatives by both governmental and private sector payers to reduce unnecessary or ineffective utilization of services has been ongoing for the past decade. Such measures, primarily directed at inpatient hospital care, have included utilization controls, such as utilization review of inpatient care, case management, preadmission screening, and discharge planning. Other cost containment efforts have been aimed at restraining price increases such as Medicare's prospective payment system (PPS), development of preferred provider organizations, and other limitations on provider fees. Since initiation of PPS, studies have found reductions in average length of hospital stay, greater use of outpatient services and increased inpatient severity of illness (Thompson, 1988).

Both within the medical community and the general public, there is growing concern that attention solely to health care costs may adversely affect health care quality. The Health Care Financing Administration, in response to that concern, has issued a Notice of Proposed Rulemaking that would allow Medicare's Peer Review Organizations (PROs) to deny Medicare payment to a physician or a hospital for services determined by the PRO to be of substandard quality (Federal Register, 1989).

Education

As the pressure increases to control expenditures for health care, there will be a corresponding emphasis on paying for treatments and procedures demonstrated to be effective, on practitioners adequately trained to carry them out, and on development of review mechanisms that monitor this care, both in and out of hospitals, for its accessibility, appropriateness, quality, and effectiveness. The education of future health care professionals must provide them with an understanding of the interrelated issues and processes as well as to principles and evolving concepts of quality assurance and risk management. Such knowledge should result in more effective and safer clinical practice as well as reduced exposure to litigation arising from allegations of substandard practice.

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Chapter IV

CURRENT AND EMERGING PERSONNEL ISSUES

Introduction

In the previous chapter seven current and emerging health issues were discussed. They were selected because of their importance as health problems and their impact on health personnel supply and requirements. Changes in the health care delivery system are affecting the demand for health personnel. Prospective payment for hospital services, for example, has increased the acuity level of patients because of earlier discharge. Delivery system changes have influenced the distribution of and demand for health personnel in different practice sites, increasing the importance of ambulatory care settings. Aging of the population, the spread of AIDS, and increases in substance abuse will further increase demands for health personnel.

The discussion of health issues made clear that personnel required to address current and future health problems cut across a broad range of disciplines and specialties. Thus, the recurring theme of the introductory chapters and, indeed, of this entire report is the need for a multidisciplinary approach to the solution of health problems.

The seven personnel issues selected for discussion in this chapter have long term policy implications for health personnel supply, requirements, distribution, and training. The data will show that supplies of health personnel in most disciplines have been increasing since the 1960s and it is expected that they will continue to increase, although at slower rates than in the past. Growth in the number of physicians, many practicing in specialized areas, has not solved the problem of access to care among the disadvantaged residents of inner cities and those living in rural areas. There continues to be a shortage of physicians in primary care--the comprehensive and continuing care that a patient receives in the initial contact with the health care delivery system. Other health professionals can also provide primary care services and a coordinated, multidisciplinary approach can help meet the long range need for such care. An important area of primary care--prenatal care--can help reduce the high infant mortality rate among certain segments of the population.

Underrepresentation of minorities in the health professions is an important cross-cutting issue. Underrepresentation affects availability of primary care in many communities, which, in turn, adversely affects health status among minority populations. High infant and maternal mortality rates among certain minority population groups are attributable at least in part to inadequate health services in the pre- and postnatal periods.

Despite progress made in expanding the supply of health personnel--in numbers, and levels of educational preparation--gaps continue to exist. The discussion of personnel issues that follows will describe these gaps.

Declining Applicants and Enrollments

In recent years in many health professions schools the number of persons applying for and enrolling in health professions education and training programs has declined. The total number of applicants to dental schools, for example, declined precipitously between 1975 and 1988 from nearly 16,000 to less than 5,400 (table IV-B-1), although declines have slowed considerably in the past few years. Though less pronounced, schools of allopathic, osteopathic, and veterinary medicine also have had a smaller number applying for entrance.

Table IV-B-1

Applicants to Health Profession Schools by Discipline

Year	Allopathic Medicine	Osteopathic Medicine	Dentistry	Veterinary Medicine
1970	24,987		10,413	
1975	42,303		15,734	
1980	36,100	3,786	9,601	7,258
1981	36,727	3,885	8,852	6,373
1986	31,323	3,514	5,724	4,751
1987	28,123	3,318	5,397	4,430
1988	26,786	3,030	5,017	4,200

Contraction of the applicant pool has aroused concern about the quality of students admitted to schools of health professions. Available data show no evidence of such declines. According to data from the Association of American Medical Colleges, the percentage of first-year students with a grade point average of 3.5 and above has actually increased since 1983 from 44.7 percent to 46.6 percent in 1987. Furthermore, the American Association of Dental School 1986/87 statistics show the lowest attrition rates in four years reversing the trend of the last decade. In addition, withdrawals for academic reasons have also declined from 46.1 percent of total withdrawals in 1982 to 38.0 percent in 1986.

Declines in number of applicants generally have been larger than declines in first-year enrollments, which means that a larger proportion of applicants are being accepted. Between 1974 (the peak year for applicants to medical schools) and 1987, first-year enrollments in medical schools increased 12 percent while applicants declined 34 percent; consequently the ratio of applicants to first-year enrollments was 2.8 to 1 in 1974 and 1.7 to 1 in 1987. However, over the 1981-87 period, first-year enrollments in allopathic medical schools, which peaked in 1981, have declined only slightly as compared with other health professions programs and have been relatively stable over the past few years. First-year enrollments in dentistry, on the other hand, have declined about 30 percent since 1978. Similarly, admissions to registered nurse programs have declined by approximately 18 percent over the 1983-86 period. Over the 3-year period from 1982-1985 first-year admissions in LPN programs have declined by 23 percent. Although first year enrollments in most other health professions schools have declined since their peaks were reached in the late 1970s and early 1980s, some have not shown declines in the past few years. For example, first-year enrollments in schools of pharmacy increased 14 percent between 1981-87, from 6,899 to 7,867.

Trends in first-year enrollments in allied health programs have varied (table IV-B-2). In physical therapy, for example, the total number of programs has increased from 47 in 1970 to 123 in 1988. Furthermore, despite the large increases in the number of programs, program directors report that there are more than enough qualified students to fill them. The situation in medical technology programs, on the other hand, is quite different. The number of CAHEA (Committee on Allied Health Education and Accreditation) accredited programs has declined 27 percent between 1982-88, from 639 to 464. Chief among the causes of the closures was the inability to recruit adequate numbers of students to justify the programs.

Table IV-B-2

First-Year Enrollments to Health Profession Schools by Discipline

Year	Allopathic Medicine	Osteopathic Medicine	Dentistry	Veterinary Medicine	Podiatry	Optometry	Pharmacy	Nursing RN	Nursing LPN
1970	11,348	623	4,565	1,430	351	884	5,694	78,524	59,128
1975	15,351	1,038	5,763	1,711	641	1,057	8,710	112,174	61,353
1980	17,204	1,496	6,030	2,239	695	1,258	7,551	110,201	58,479
1981	17,320	1,552	5,855	2,246	702	1,249	6,899	115,279	60,426
1986	16,779	1,724	4,554	2,273	815	1,210	7,669	90,693	47,034*
1987	16,686	1,692	4,370	2,199	716	1,268	7,867	94,594	
1988	16,741	1,772	4,196	2,195	595				

* 1984-85 data

Factors in the Decline

Three factors have been responsible for the contraction of the pool of applicants and first-year students in health professions education programs: changes in career choices among men and women, changes in age distribution of the population, rising costs of higher education and rising levels of student indebtedness. Additionally, the "image" of some health careers has deteriorated in recent years adversely affecting recruitment efforts.

Career Choices

Career choices among men and women have changed markedly over the last 10 years. Among the factors influencing choices are changes brought about by the women's movement and the relatively high earnings potential and starting salaries offered to baccalaureate degree recipients in such fields as computer science, engineering, and business.

Not only have shifts in career preferences appear to have had a negative effect on the numbers of students pursuing health careers, but they have also led to a significant change in gender, and, to a lesser extent, in the racial composition of the applicant/enrollee pool as well.

One cause of recent declines in applicants and first-year enrollments in health professions programs has been the decline in the number of men choosing careers in medicine, dentistry, pharmacy, and similar health professions. While total enrollments in baccalaureate and master's degree programs in engineering and computer science (dominated by men) increased more than 100 percent between 1978 and 1985, enrollments in the health sciences increased only 39 percent. Furthermore, the number of bachelor's and master's degrees awarded in computer science, engineering, and business and management have continued to grow at a rapid rate, while those awarded in life sciences, the primary major degree field for persons wishing to pursue careers in the health professions, declined 44 percent between 1976 and 1986. The number of first-professional degrees awarded in the health fields between 1975 and 1985 increased only 25 percent, mostly attributable to increases in the number of degrees awarded to women. In fact, the actual number of first professional degrees awarded to men in the health fields remained relatively unchanged between 1975 and 1985 at about 21,500, while those awarded to women increased by almost 20 percent.

While women compose the major share of health personnel--about 80 percent in all disciplines--there has been a marked increase in the number of women applying for and entering first-professional degree programs. This has affected the applicant/first-year enrollment pool in health professions training programs in several ways. On one hand, increased enrollment of women in all first professional degree programs has helped stabilize and maintain the numbers of students enrolled in the health fields by lessening the impact created by reduced enrollment of men. On the other hand, as more women have chosen to become doctors, dentists, pharmacists, and the like, the pool of women available for more traditional health careers, such as nursing and dental hygiene, has contracted. Furthermore, like their male counterparts, many women are choosing careers outside the health field. The number of women choosing careers in law, business, and management has increased significantly. For example, in 1985-86 almost 40 percent of all degrees awarded in law were awarded to women, a significant increase over the 1975 figure of 19 percent. The pool of men and women pursuing careers in health fields thus has been reduced.

Demographic Trends

Shifts in career preferences have not been the sole cause of declines in applicants and first-year enrollments in many health professions schools and programs in recent years. Demographic trends related to the age distribution of the population have contributed as well. According to population estimates and projections developed by the U.S. Bureau of the Census, the total number of persons aged 18 to 25 fell approximately 12 percent from 1981-1988 and is expected to continue to decline through the end of this century. It is this age group that traditionally has constituted the bulk of the postsecondary student population entering health professions' schools.

Although in recent years the number of older persons returning to school has increased, it is largely the cohort of younger students that comprises the base of the labor force and of health personnel. Decreases in the size of this segment of the population therefore serve to partly explain the recent contraction of the total health professions applicant pool. Data from the National Center for Educational Statistics show that enrollments among persons under 25 years of age declined about four percent between 1982 and 1987, from 7,579,000 to 7,249,000. According to the Center's projections, enrollments in institutions of higher learning among persons under 25 years of age are expected to continue to decline at least through 1997. Chief among the causes is a projected slowdown in the rate of growth of women enrolling in institutions of higher learning, which grew 30 percent between 1975 and 1987. With continued declines in the number of men attending college and slower growth in the number of women attending college, the overall applicant/ enrollee pool can be expected to shrink even further in the coming years.

Costs of Health Professions Education

While demographic trends and changing individual career preferences have contributed to the recent declines in applicants and first-year enrollments in health professions schools, financial factors also appear to be playing a role in the number of people entering these professions. Health professions education programs are among the lengthiest and most expensive of all professional training, although the rate of return is believed to compensate in terms of potential income and career opportunities. Nonetheless, the cost of these programs has continued to increase more rapidly than other non-health professional training. Tuition increases at health professions schools and other related expenses, coupled with constraints on availability of low cost alternatives to financing educational costs, have caused considerable increases in the level of indebtedness for students. One study estimated that typically three of four students in allopathic and osteopathic medical schools, dentistry, optometry, and veterinary medicine schools borrow between 70 to 90 percent of their professional education costs, with the typical student in most of these professions borrowing $6,000 or more annually, resulting in a sizeable debt load by the time of graduation. The mean educational debt of graduates of schools of veterinary medicine, for example, was $19,700 in 1988, and 1987 graduates of dentistry had debts averaging $39,000. In 1988 the average graduating senior in podiatric medicine owed $60,000; the graduate of osteopathic medicine owed an average of $64,700.

High indebtedness may be one deterrent to choosing health professions' careers, but little information is available to assess the degree to which it may influence career decisions or later decisions related to choice of specialty, employment setting, or geographic area. However, if health professions' educational costs continue to escalate and if the need to borrow larger and larger amounts of money increases, then financial considerations may well serve as strong *disincentives* for choosing health professions careers. Many observers are concerned by the level of indebtedness and its impact on supply and distribution of health professionals.

Future Directions

Several factors have been discussed as possible reasons why the number of persons applying for and entering educational programs in the health professions has declined. The degree to which these factors will influence the applicant/enrollee pool in the years ahead is difficult to project. In some fields, it appears as though declines have leveled off. First-year enrollments in schools of allopathic medicine increased 4.2 percent in 1988 over the 1987 level, and admissions into registered nurse training programs increased 4 percent between 1986 and 1987. The National League for Nursing has noted that this increase may signal a reversal of the five year trend of declining admissions and enrollments.

Concern over the dwindling size of the student population and applicant pool reflects the perception that this trend will negatively affect the Nation's supply and quality of health personnel. Overall, the supply of health care personnel is expected to grow through the end of the century despite recent declines in applicants and first-year enrollments. Although the number of graduates is expected to decline toward the end of the 1990s, the number of entrants is still expected to be larger than the number of health care providers leaving the labor force. Thus, the supply of most health professionals is expected to grow through the year 2000, although most likely at a slower rate.

Implications of enrollment declines are much less certain beyond the year 2000. Even though supply of health personnel in nearly all fields is expected to be larger in the year 2020 than in the late 1980s, growth in some health professions categories is expected to average one percent or less annually, slower than growth of the general population. Whether supply in these categories will be adequate to meet needs is questionable. Rapid growth in the number of health care practitioners during the 1970s and early 1980s will provide a strong foundation to meet future requirements for health personnel. With the exception of dentistry and nursing, the practitioner/population ratio is expected to increase. Whether the increase will help solve the many problems related to access to care, quality and costs of care, and additional knowledge and skills needed to provide care, remains to be seen.

NURSING SHORTAGE

What has been designated as the "nursing shortage" is related to an imbalance between the number of active nurses and the fast-growing demand for nurses, particularly registered nurses with baccalaureate or higher education. During the mid-1980s the question of adequacy of the registered nurse supply to satisfy the national demand for nursing services became a major issue. The issue, given much prominence by the media, was the focus of a number of legislative and executive initiatives. A Commission on Nursing, appointed in 1988 by Secretary Bowen of the Department of Health and Human Services, reviewed the nursing shortage issue intensively. This section highlights the major points about the nursing shortage and discusses the suggested solutions with emphasis on the Commission's conclusions.

The Commission, consisting of 25 members drawn from nursing, other health care areas, and the public, concluded in its Interim Report that ". . . the reported shortage of RNs is real, widespread, and of significant magnitude." (DHHS, 1988a). In assessing the cause of the shortage, the report concluded that it was . . . primarily the result of an increase in demand as opposed to a contraction of supply. The RN supply continues to grow, but the number of new graduates has declined, and there are strong indications that RN supply has not kept pace with increased demand. Along with considerable documentation of shortages in the hospital area, the report noted evidence of shortages throughout the health care system.

Demand for Registered Nurses

While the total number of nursing personnel (registered nurses, licensed practical nurses, and nurse aides) employed in hospitals has decreased, the number of registered nurses employed has increased as hospitals have begun raising the skill level of their nursing personnel. Data from the American Hospital Association annual surveys show that between 1982 and 1987 total nursing personnel in hospitals decreased 7 percent while the number of registered nurses increased 3 percent. In community hospitals, where the majority of nursing personnel are employed, the ratio of full-time equivalent registered nurses per 100 adjusted patient census increased from 77 in 1982 to 98 in 1987.

Despite the increase in number of registered nurses employed, hospitals have been reporting serious shortages. A study carried out by the American Hospital Association's Center for Nursing in December 1987 reported an average hospital vacancy rate of 11.3 percent (AHA, 1987). Preliminary data from a second study conducted in December 1988 by the same organization reported an average vacancy rate of 10.6 percent, suggesting a slight decline in the rate. Other measures of shortage also do not appear to show much change and another survey by the American Hospital Association, found that the personnel category with the most serious shortage was registered nurses (AHA, 1989).

A number of statistical analyses of the nursing shortage in hospitals have been carried out (summarized in chapter VIII). Despite use of what would appear to be sound analytical models, none of the studies provided a basis for a comprehensive understanding of reasons why demand for registered nurses exceeds the supply. More intensive study of this question would seem to be warranted.

Although extensive data that would allow for the same type of analyses are not available for the non-hospital sectors of the health care system, there is evidence that concerns about level of care in nursing homes could be exacerbating an already chronic shortage situation. A study by the Institute of Medicine points to the need of nursing home residents for careful assessment and care planning that require professional skill and judgment. The study emphasizes that much nursing home care is carried out by poorly trained, inadequately supervised nurse aides caring for more residents than they can properly serve. The Omnibus Budget Reconciliation Act of 1987 stipulated requirements for registered nurse staffing above the level that most nursing homes now have. Yet, according to data in the national sample surveys of registered nurses conducted by the Division of Nursing, BHPr, the number of registered nurses employed in nursing homes and related care facilities declined between November 1984 and March 1988, from 115,200 to 107,800.

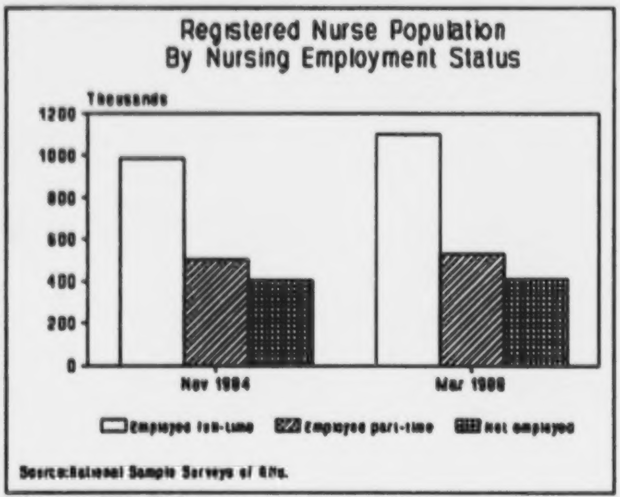
On the other hand, the number of nurses employed in home health care has increased, although the number of Medicare home health visits has declined. Adequate data sources do not exist to count the total number of both Medicare and other types of home health visits. Two possible conclusions may be that there was an increase in the number of non-Medicare home health visits brought about by restrictions in approval of these visits by Medicare and/or an increase in the complexity of the home health cases, thus requiring longer visits by registered nurses.

As indicated in chapter VIII, it is anticipated that changes in health care delivery, trends in nursing, and in characteristics of the population to be served would cause future requirements for registered nurses to increase. Thus, while the cause of the current shortage has been attributed to employer demand, questions of the adequacy of the supply need to be examined as well.

Registered Nurse Supply

Both the total number holding licenses to practice as registered nurses and the number of employed registered nurses are increasing. In the March 1988 National Sample Survey of Registered Nurses, there were an estimated 2,033,000 registered nurses, an increase of 7.7 percent over the number found in a similar survey of November 1984, which preceded the nursing shortage (Moses, 1984). The number of employed RNs increased 9.5 percent, from 1,486,000 in 1984 to 1,627,000 in 1988. An even greater increase was shown for those employed in nursing on a full-time basis: an estimated 984,300 in 1984 compared with 1,099,600 in 1988, an increase of 11.7 percent (figure IV-C-1). Thus, the number of registered nurses continued to increase during the recent period of mounting vacancies and other evidences of shortages.

Enrollment in schools of nursing is a major factor affecting the supply of registered nurses. Admissions to programs preparing students to become registered nurses significantly declined between the 1983-84 academic year and the 1986-87 year. Although admissions in the 1987-88 academic year increased 4.3 percent over the prior year, the number of new students remained considerably lower than the number in each of the years before 1983-84. It is too early to determine whether this one year of increase is an indication of increases for future years.



Source:National Sample Surveys of RNs.

Figure IV-C-1

Other factors affecting the supply are the extent to which registered nurses will be actively employed in nursing and the extent to which they will maintain their licensure. The 1988 sample survey shows that 80 percent of all licensed RNs are actively employed in nursing, an increase over previous years. However, the activity rate decreases with age for any given time, from about 97 percent for those under 25 to 70 percent for those in the 55-59 year age group, to 36 percent for those aged 60 and over.

As pointed out in chapter VIII, the age level of registered nurses is increasing due to declining numbers of new graduates coupled with the older age of more recent graduates. Assuming that no significant changes in the current behavior patterns of registered nurses would occur, and taking into account the potential available student body, projections of supply included in chapter VIII show that while the active supply will increase for the next 15 years, there will be persistent and substantial declines thereafter. Given continuing current trends in supply of and requirements for registered nurses, it is anticipated that, despite supply increases through the year 2005, requirements will outstrip the number available.

Composition of Registered Nurse Population

Registered nurses are almost all female. The proportion of male RNs working in March 1988 was only slightly higher than in November 1984, 3.3 percent compared with 3 percent. Thus, while many of the predominantly male health professions show significant increases of women professionals, nursing has not succeeded in attracting large numbers of men.

Registered nurses are also predominantly white, non-Hispanic. Despite the increase in the number of registered nurses between 1984 and 1988, the numbers of those of minority racial/ethnic backgrounds showed little change. Only 7.6 percent of the RN population in 1988 had minority backgrounds, about half of whom were Black, non-Hispanic.

Compensation of Registered Nurses

Data in chapter VIII show that salary levels for beginning registered nurses are in line with other beginning professionals. Also, the average salary of full-time employed staff nurses has increased 21 percent between 1984 and 1988, from $21,700 to $26,300. However, about two-thirds of all registered nurse positions are staff positions and the majority of registered nurses remain in staff positions throughout their careers. Studies show that the difference between the average salary for a beginning nurse and the average salary for all employed staff nurses is less than $4,000. Also, the average salary for an administrative position in 1988 was $34,600, a difference of only $8,300 between a staff and an administrative position, the highest level in nursing. Therefore, it should be noted while nurses begin at a salary equivalent to that of other beginning practitioners, the highest salaries they can expect in their careers are not much higher than their beginning salaries.

Solutions for the Nursing Shortage

Groups studying the issues involved in ensuring an adequate supply of registered nurses, including the Secretary's Commission on Nursing, have pointed to the twofold nature of the solution: increases in nurse productivity and increasing the attractiveness of a nursing career. In particular, the Commission cited a number of interventions to alleviate the current shortage and assure an appropriate level of future nursing resources. Recommendations were developed from both demand and supply sides of the nursing shortage issue: utilization of nursing resources, nurse compensation, health care financing, nurse decision-making, and development and maintenance of nursing resources.

In the area of utilization of nursing resources the recommendations were designed to promote the most effective use of registered nurses through provision of adequate clinical and nonclinical support services; development of staffing patterns that would appropriately utilize different levels of registered nurses as well as other nursing personnel responsible to registered nurses; development and adoption of automated information systems and other labor saving technologies to increase registered nurse productivity; and development and implementation of methodologies to determine and track nursing resource costs and utilization for more effective internal management.

The Commission's recommendations in the area of compensation related both to demand and supply. Provision by health care delivery organizations of adequate and appropriate compensation for nurses was seen as leading to more effective utilization of nursing resources, retention of nurses by their employers and within the nursing profession, and improvement in attractiveness of nursing as a career. In addition, the Commission felt that failure to recognize the registered nurse's decision-making ability affected the attractiveness of nursing as a career and placed limitations on patient care delivery. A series of recommendations were made, therefore, that included nurses in policy-making areas both within the health care delivery organization and in the health care system's public and private governing bodies.

The final set of recommendations pertained to the development and maintenance of nursing resources (DHHS, 1988b). The Commission indicated that, while the current nursing shortage was assessed as demand-driven, the decrease in nursing school enrollments may precipitate growing shortages in the future. It was felt that there was also some cause for concern in the distribution of registered nurses across specialties and employment settings and in the preparation of nurses for current clinical practice requirements. Accordingly, recommendations were made for increasing availability of nursing education, examining the curricula, and improving the public image of nurses.

The Commission recommended that, to maintain the appropriate level of nursing resources in the future, efforts needed to be devoted to monitoring nursing resources and the nursing labor market and to carrying out research and demonstrations to examine the effects of various factors on the attractiveness of a nursing career and on the health care delivery system. A need was also seen to monitor implementation of the recommended courses of action prescribed in the Commission report.

The Assistant Secretary for Health has approved a plan developed by the U.S. Public Health Service (PHS) to implement the Commission's recommendations. The plan coordinates PHS activities underway in areas such as research, financial assistance, and program development. It establishes new initiatives through reexamination, priority setting, and targeting. It further includes liaison activities with the private sector and other public entities for reducing nursing shortages.

Specifically the implementation plan contains nine objectives, grouped into three broad categories: resource utilization, resource development, and resource maintenance. Essentially, the resource utilization objectives address the need for developing, demonstrating, and evaluating cost-effective methods for utilizing nursing, allied health, and support personnel. In resource development, the plan calls for a reexamination of legislative strategy regarding nursing education. For resource maintenance, the need for monitoring and assessing nursing supply and demand is recommended.

In another action to implement the Commission's recommendations the Bureau of Health Professions contracted with the Project Hope Center for Health Affairs, to provide an action plan for establishing a database within a nursing and a continuing strategy to meet critical nursing data needs. A meeting of experts in September 1989 helped initiate development of the action plan. A meeting in October 1989 of another group of experts examined new projection models for nursing personnel.

Finally, in another development Congress enacted the Nurse Shortage Reduction and Education Extension Act of 1988 (Title VII of P.L. 100-607). A number of its provisions address approaches to broadening the base for recruitment into nursing and to making nursing a more attractive career in order to retain those already in nursing. The U.S. Department of Health and Human Resources (DHHS) is implementing both the programs with continuing authorization and those newly authorized, such as the scholarships for undergraduate education, that contribute to enhancing the available nursing supply.

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Primary Care Concerns

Primary care is that care the patient receives in the initial approach to the health services system. Most of the commonly occurring health care problems require this care. Primary care practitioners enhance access, improve health outcomes, minimize unnecessary utilization, and lower costs. They promote preventive behaviors that lead to disease prevention, less frequent hospitalization, and ultimately lower costs. Primary care is patient-oriented rather than disease-oriented care. This comprehensive approach requires the skills of a multidisciplinary team of practitioners managing the physical, psychological, and social aspects of care.

Definition of Primary Care

The key elements of primary care were delineated in 1973: (1) First-contact care, including initial evaluation and care for the patient and dealing with the majority of his or her health care needs; (2) assumption of longitudinal responsibility for the patient regardless of presence or absence of disease; and (3) coordination of other health resources for the patient (Alpert and Charney, 1973).

In 1978 the Institute of Medicine identified five essential attributes for the practice of good primary care: (1) Accessibility; (2) comprehensiveness; (3) coordination of services; (4) continuity of services; and (5) accountability (National Academy of Sciences, 1978).

Within the network of health care delivery, particularly in managed care settings, primary care services are provided by a team consisting of a host of health profession disciplines, including allopathic and osteopathic medicine, specifically general/family practice, general internal medicine, general pediatrics, obstetrics/gynecology, dentistry, optometry, pharmacy, podiatry, physician assistants, nurses, emergency care personnel, chiropractors, and a range of allied health professions.

Shortage of Primary Care Physicians

More primary care practitioners are needed. According to the New York State Council on Graduate Medical Education during the last decade medical care has continued to be technology intensive, but there has been a growing national consensus that a mismatch exists between proportion of primary care physicians needed (about 70 percent) and proportion in practice broadly defined (about 30 percent) (NYS Council, 1988). Despite the widely-recognized need for more physicians to enter primary care, the trend has been toward more specialization, in part for the following reasons:

- *The physician payment system has favored procedure-oriented subspecialty medicine over "cognitive," non-procedural medicine. As a result, there is a disparity in net income between primary care doctors and more technologically-oriented specialists, with family physicians and pediatricians earning an average of one-half that of radiologists and general surgeons. The Federal Physician Payment Review Commission (PPRC) has been working to develop a methodology to redress this imbalance through the use of a fee schedule based on resource costs of physician services. Until reforms of this nature are implemented, the gap in income potential between primary care doctors and other specialists, combined with rising tuition costs and indebtedness, creates a powerful incentive for residents to enter nonprimary care specialties.*

- *Primary care training, particularly the experience in an ambulatory care setting, is often not accorded appropriate recognition. Inadequate time, resources and deemphasis on curriculum have compounded the problem. Most clinical training occurs in the hospital setting. With shortened length of stay the hospital has become a source of "snapshot" care at a highly technical level. There is little opportunity for medical students and residents to experience a true primary care practice in ambulatory settings and for primary care faculty to serve as role models.*

- *Financing is the most pervasive problem for medical education in primary care. Educators believe that primary care training programs are inadequately financed. The following characteristics of costs and reimbursement affect graduate medical education and tend to create a negative impact on residency training in primary care:*

    - *Reimbursements, which provide substantial financing of faculty support, tend to be lower for primary care; this differential results in lower patient service income from lower payments for primary care's "cognitive," or nonprocedural services;*

    - *training in ambulatory settings cannot achieve the same efficiency in combining service and education that inpatient services can, adversely affecting balance sheets for primary care programs;*

- *insurance coverage for ambulatory services is far less, and the burden of unreimbursed and uncompensated care (especially in public facilities) is far greater, for ambulatory than for inpatient services; and*

- *financing from hospital sources is reduced or absent if ambulatory training centers are free-standing. (Masica et al., 1984).*

Efficacy of Primary Care

At a BHPr-sponsored conference in December 1984, participants agreed that primary care medicine can improve the health of America's population and contribute to economic stabilization of the medical industry in the following manner:

- *Primary care medicine enhances access, which can improve health outcomes and lower costs. Primary care practitioners are uniquely trained to serve in remote areas where technological support required by other specialists is often unavailable. To the extent that the practice of health promotion and disease prevention improves health status, it prevents or postpones illnesses that often require expensive specialty care, thus restraining overall health care expenditures.*

- *Primary care physicians, as care coordinators, assure provision of cost-effective, high quality care. There are a host of individual and social factors that influence a person's decision to seek and continue with medical care. Primary care physicians work with individuals at the first contact to clarify these factors to assist in determining the appropriate regimen of care.*

- *Primary care physicians promote preventive behaviors, which when practiced, lead to disease prevention, less frequent hospitalization, and lower costs. Primary care physicians are trained to assume longitudinal responsibility for patients regardless of the presence or absence of disease. Primary care physicians can emphasize and monitor compliance with prescribed regimens of care and promote care that can be practiced at the family level. Primary care physicians integrate physical, social, and psychological aspects of patient care (Alpert and Charney 1984).*

Training for Physicians in Primary Care

Increasing specialization, accompanying a decline in number of physicians in general practice--from 90/100,000 in 1931 to 46/100,000 in 1959--has resulted in a national commitment to the training of primary care physicians. Three separate commissions, including the National Commission on Community Health Services, The Citizen's Commission on Graduate Medical Education (GME), and The Ad Hoc Committee on Education for Family Practice have called for the creation of personal or primary care physicians. These goals were enhanced by health professions' legislation, which, beginning in 1971, funded postgraduate and undergraduate Family Medicine education. In 1976 the Federal Government added support for General Pediatrics and General Internal Medicine. This legislation was followed in 1975 by private foundation support for demonstration programs to improve personal health services (Alpert et al., 1984).

The Bureau of Health Professions' Division of Medicine has awarded grants for over a decade to allopathic and osteopathic medical schools and nonprofit hospitals for planning, development, and operation of training programs in family medicine, general internal medicine, and general pediatrics. These activities generate and maintain interest at the undergraduate and graduate levels by providing initial and continuing exposure to primary care practice. Programs provide training experiences in urban and rural underserved areas, support cost containment, quality assurance and overall curricular effectiveness studies, and enhancement of faculty skills in primary care.

Federal support also has enabled training programs to enhance curricula in: geriatrics, preventive medicine, health promotion and disease prevention, nutrition, alcoholism, psychosocial issues, and human immunodeficiency virus (HIV) infection. The flexibility of the primary care model enables it to respond to such emerging health care issues.

The number of family practitioners/general practitioners (FP/GP), which was 54,557 in 1975 increased to 67,687 in 1986. Graduates in general internal medicine provide care to a previously underserved part of America, treating more elderly, non-white, low income, and "underinsured" individuals. Pediatric primary care graduates have entered practice in underserved urban areas in a greater proportion than graduates of traditional programs in Pediatrics. Family Practice (FP) graduates have selected rural practices in much greater numbers than physicians in other specialties. Over half of FP graduates between 1981 and 1984 have settled in communities of less than 25,000 people, and more than half of these are located more than 25 miles from an urban center. Thus, primary care physicians have substantially improved access to medical care of minorities, the poor, and those living in inner city and rural areas (Alpert et al., 1984).

In March of 1988, the Health Resources and Services Administration (HRSA) sponsored another in a series of conferences on primary care medical education (DHHS, 1988). Conferees concluded that:

- *The three primary care disciplines should improve collaboration, such as sharing residency training programs,* *particularly in ambulatory and community settings. Faculty development and joint research projects can also enhance working together.*

- *Incentives are needed to attract more medical students into primary care.*

- *Although many programs have been established, primary care is not fully institutionalized. Many institutions remain nonresponsive and nonsupportive of primary care.*

- *Research activities in primary care departments must be enhanced to provide a sound foundation for the knowledge base of primary care. Faculty development grant programs have recently been extended to 2-year stipends to retain fellows in order to develop the necessary research skills and serve as role models for trainees.*

Multidisciplinary Approach

In order to respond to the growing needs of patients in a variety of settings, the skills of different types of health care personnel should be fully utilized, including physicians, nurses, pharmacists, dentists, optometrists, podiatrists, chiropractors, and a number of specific allied health care providers including physician assistants, in a multidisciplinary team approach.

Nursing education, regardless of type of program, has emphasized the caring aspects of patient care in order to complement the predominantly curing focus of the physician. This training provides counseling and interpersonal skills, teaches provision of emotional support as needed and focuses on a variety of settings such as home and community. Several studies have evaluated the effectiveness of the nurse practitioner in assessing the health status of children and utilizing other members of the health care team in a variety of settings. The family nurse practitioner is trained to be responsible for decision making in relation to patient health need and works collaboratively to provide services to individuals, families, and groups. Practice is community oriented, and, recently, training has been developed in gerontology, family, adult, pediatric, and school practice.

Pharmacists can contribute to the primary care network in many ways. Because pharmacists are probably among the most accessible of the potential primary care providers, they are able to improve access to care. They do not require appointments and are located in all areas of the Nation, from low-income areas in major cities to small communities in rural America. Also, pharmacists, through coordinated efforts with dieticians and nutritionists, can provide sound dietary and nutritional support to meet the needs of the growing elderly population. Pharmacists can provide this support to institutionalized as well as home-based patients by working closely with the patients' physicians. The development of new diagnostic procedures and test kits has also given pharmacists another opportunity to directly assist the patient. These activities supplement their checking/preventing drug interactions and reducing drug costs by appropriately using generic substitutions.

The dentist is not only the primary provider of dental services, but in many instances, the primary contact for the patient with the health care delivery system. Many systemic diseases are first manifested in the oral cavity. The dentist functions as an integral part of the team. A continuing issue facing dental education is preparing skilled general dentists who provide a broader range of clinical services. As the number of graduating dentists declines some new graduates must be encouraged to establish practices in more rural or underserved areas to improve availability and accessibility of primary dental care.

For many patients with vision problems, optometrists are the initial contact point into the health care delivery system. Services such as contact lenses, vision therapy, and low vision aids are directly provided to the patient. Because optometrists may be the point of first contact, they should be integrated into the multidisciplinary team.

Historically, podiatric practitioners have been generalists performing minor surgical and other operative procedures on the foot, prescribing corrective devices, and prescribing and administering drugs and physical therapy. Recently, specialty boards have been established in surgery and orthopedics as well as public health. Recognizing the need to emphasize the role of podiatrists in primary care, the Health Professions Reauthorization Act of 1988 (PL 100-603) amended Title VII of the Public Health Service Act to support primary care residency training in podiatric medicine.

Many patients with musculoskeletal problems seek the care of chiropractors. Operating independently and licensed, chiropractors administer physical and electrical therapy. Alleviation of pain is a prevalent symptom for which many patients seek intervention from the health care delivery system.

Occupational and physical therapists provide direct primary care services to patients. Occupational therapists can play a major role in helping patients to perform daily tasks, diminish or correct pathological problems, and promote or maintain health. Occupational therapists also introduce patients to equipment such as wheelchairs and splints, custom design equipment, and recommend changes in work or home environment.

Physical therapists can also work directly with individuals to plan and administer treatment to relieve pain, improve functional mobility, maintain cardiovascular function, and limit the disability of injury or disease through prescription of patient exercises for improved endurance, strength, coordination, and range of motion; activate paralyzed muscles through electrical stimulation; instruct in the use of crutches or canes; and alleviate pain and promote healing in soft tissues by massage or electrotherapy.

Training programs for physician assistants continue to focus on primary care. Primary care practice is further encouraged through joint team training with family medicine residents and medical students who plan to practice family medicine. Physician assistants bring an added dimension of improved patient communication and enhanced disease prevention and wellness activities. Studies also show that physician assistants improve access to primary care both in rural and inner city areas including correctional institutions, community clinics, and extended care facilities. The role of the physician assistant in providing primary care in the home is also being pursued in curricula. More training in home health care will enable the physician assistant to become an integral care giver to the growing elderly population. Less than full reimbursement for these services, however, is a significant impediment to full utilization of skills in the care of home-bound patients.

Finally, occupational therapists, physical therapists, respiratory therapists, dieticians, and nutritionists, along with physicians and community health nurses, may be trained to provide coordinated home health and hospice care services for patients.

The Nation continues to need primary care services. These services are delivered in a variety of settings by a combination of practitioners. The complementary skills of a team avail patients of comprehensive, coordinated, continuous, and accountable care. Programs that produce primary care practitioners are not self-sustaining. Current reimbursement procedures do not underwrite many of the essential services provided by primary care practitioners. The future supply of primary care physicians is expected to barely maintain its current share of supply, a share predicated on a continuation of the current level of support received by these training programs. Without continued financial support it seems unlikely that the supply of primary care providers can be sustained or that access for the underserved will be noticeably improved.

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Allied Health Manpower Concerns

As discussed in chapter X of the report, the allied health field is faced with a number of problems including growing shortages of personnel in a number of critical professional categories, reductions in program enrollments, closures of training programs, under-representation of minorities, and shortages in faculty and trained researchers. These problems are brought about by changes in working environments, the need to contain costs, changing career preferences of a new generation of students, and rapid growth in segments of the population utilizing allied health services.

Growing Shortage of Personnel

The Institute of Medicine (IOM) in its Report to Congress on the Study of the Role of Allied Health Personnel in Health Care Delivery notes that large discrepancies between supply and demand for allied health practitioners have been reported in physical therapy, radiologic technology, medical records services, and occupational therapy. (DHHS, 1988) Most recently, professional association newsletters have indicated that employers are having increasing difficulty in attracting and retaining medical laboratory technologists and dental assistants. Bureau of Labor Statistics (BLS) data show unemployment rates for therapists and laboratory personnel in 1988 that are far below the national average.

The IOM Study Committee did not explicitly report an overall shortage of allied health personnel, but drawing heavily upon BLS projections, it did report that demand for personnel in nine of ten fields studied is expected to exceed the projected 19 percent growth rate for the total U.S. labor force by the year 2000. Demand for physical therapists is expected to increase 87 percent by the turn of the century, the greatest growth of any allied health field. Close behind were medical record technicians (75 percent), radiologic technology (65 percent), occupational therapy (52 percent), and respiratory therapy and speech pathology (34 percent).

Difficulties in filling positions for specific categories of allied health personnel are also seen on a regional level. For example, the Metropolitan Chicago Healthcare Council found in its recent annual survey of area hospitals that some of the highest vacancy rates reported were in allied health, including vacancies exceeding 15 percent for physical therapists (greater than registered nurses), over 7 percent for occupational therapists, and 6 percent for nuclear medical technologists.

Reductions of Enrollment and Program Closures

The number of programs and students has a clear relationship to the size and composition of the allied health workforce. A factor that is closely related to the apparent shortage of certain types of allied health personnel is a decrease in the number of accredited programs in many allied health fields. Recent data from the American Medical Association's Committee on Allied Health Education and Accreditation shows a substantial decline in a number of disciplines (AMA, 1989). For example, the number of cytotechnologist programs declined by two-thirds in a 12-year period, medical technologist programs declined by one-third, and radiographer programs declined by 27 percent. The Commission on Dental Accreditation has also reported declines in dental assisting programs on the order of 8 percent (ADA, 1988). Compounding the losses incurred through program closures are reports of substantial reductions in enrollments in training programs.

With the exception of physical therapy, many allied health disciplines are sustaining declines in applications. In order to reverse these trends, it will be necessary to increase interest in allied health careers early in the educational process and to seek students from less traditional applicant pools--minorities, older students, career changers, those already employed in health care, men in fields where they are underrepresented, and individuals with handicapping conditions.

Trends in College Enrollment

In most allied health occupations, graduation from a 2- or 4-year college program is required as a condition of entry. Thus, trends in higher education enrollment are critical to the potential labor supply of allied health personnel and declines in applications. Especially relevant is the decline in the college-age population due to a decrease in birth rates over the last two decades. Such declines are expected to continue to 1996, when the number of eligible traditional college age candidates will be nearly one-fourth below the 1980 peak. College population, and consequently the pool of potential allied health supply, can only be maintained if a higher proportion of youths go to college or if non-traditional groups are recruited. Adaptation to these conditions will require significant changes in the criteria traditionally employed for college admission as well as a restructuring of the ways in which allied health professionals are trained.

Minorities in Allied Health

The number and proportion of minorities in many allied health fields remains small. Beyond issues of equity the recruitment, retention, and graduation of minorities is a particular concern for a number of reasons. Minorities represent a relatively untapped source of manpower; their representation in the population as a whole is increasing, and minority health professionals are more likely to serve underserved populations. It is critical that mechanisms be developed to increase the representation of minorities within the allied health workforce.

Faculty and Researcher Shortages

Constraints to supply can exist for many reasons including lack of faculty. While there is ample reason to expand the capacity of basic occupational preparation, costs of establishing new programs and salary levels needed to attract qualified faculty are discouraging to many academic institutions. In physical therapy, a field that is experiencing serious shortages, there is substantial demand for training since there are five applicants for each first-year space. Expansion of training capacity in physical therapy is in part constrained by a lack of qualified faculty. The profession predicts that many additional doctoral qualified faculty will be needed to teach in physical therapy entry-level education programs over the next decade. In occupational therapy, the inability to obtain qualified faculty members is a serious problem for some established educational programs. Such needs are unlikely to be met without faculty training programs, making it very difficult to increase the number of students needed to meet requirements.

The accelerating pace of change in treatment modalities driven by new technologies demands serious research into the effectiveness of treatments and services provided by allied health personnel. All too often clinical treatment is guided by convention rather than empirical assessment and research. Improved deployment and utilization of allied health workers may require productivity studies. Clinical and systems research in allied health are almost non-existent, yet these disciplines number over 3 million health care providers. Some fields are only beginning to develop research leaders to build a body of knowledge linked to a theoretical framework. A real need exists for enhancing the research skills of allied health faculty.

Changing Career Preferences

An important factor influencing career choice is students' perceptions of employment opportunities. The proportion of women baccalaureate graduates choosing health careers has increased over the past two decades. According to the Bureau of Labor Statistics employment in many fields popular with women such as teaching and social work is expected to grow more slowly than the allied health fields in the coming years (Fullerton, 1987). To the extent that these expectations affect students' choice of careers, the allied health fields need to closely monitor career expectations and build linkages between employers, practitioners, educational institutions, and State and local governments if they are to remain competitive in recruiting quality students into allied health training programs.

Increases in Elderly Population

Although population growth is slowing, differential rates of growth among the various segments of the population will affect demand for certain types of allied health practitioners. As the number of elderly increases, the demand for allied health practitioners in a variety of fields will rise accordingly, and combined with greater longevity will have a significant impact on demand for practitioners in rehabilitation fields such as occupational therapy, physical therapy, respiratory therapy and audiology.

The 1987 Report to Congress on Personnel for Health Needs of the Elderly (DHHS,1987) identified 3,800 additional full-time equivalent physical therapists needed to serve older adults in the year 2000. Among occupational therapists, it is estimated that a minimum of 7,200 FTE personnel will be needed to serve persons 65 years and older in the year 2000. The requirements for additional audiologists and speech pathologists to serve the needs of the elderly will also be substantial.

Changes in Disease Patterns

Two changes in disease patterns deserve special attention because of their potential impact upon allied health personnel. The first is the growing HIV/AIDS epidemic. Physical therapists, occupational therapists, respiratory therapists, and other allied health personnel play major roles in directly assisting patients with HIV infections and need to be fully prepared to deal with this problem. Second, chronic conditions are most prevalent in the elderly, the fastest growing group, and allied health practitioners need to be exposed to interdisciplinary and multidisciplinary approaches to the treatment of older patients.

Allied Health Personnel and Health Care Industry Structure

It is important to understand the effects of changes in the structure of the health care system on demand for allied health practitioners. For example, as patients' hospital length of stay becomes shorter, the need for home health care increases and, consequently, additional practitioners with different skills may be needed. Such system changes are occurring with increasing frequency and need to carefully studied if informed manpower policy decisions are to be made. Also, the financing of health services influences the demand for allied health personnel, the location in which services are provided, and the type of provider. Reimbursement policies can create significant displacements of the allied health work force, and need to be evaluated in order to minimize disruptions in patient care.

Technological Change

The direction of technological change and its impact upon allied health employment are difficult to fully assess. Among factors to be considered are the following: automation in clinical laboratories, which decreases complexity of tasks and may increase productivity, increased use of computer-based technologies, and advances in technology that permit more health care to be delivered in outpatient settings.

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Public Health Manpower Concerns

Adequate, timely data on professionals employed in public health are not available. Schools of public health have begun to compile routinely educational data concerning numbers of students and their characteristics, but there are few data sets on personnel in the work force. As discussed in chapter IX of this report efforts must be made to define the public health work force, develop systematic methods to obtain data, and improve methods for estimating personnel supply, demand, and requirements.

In the absence of hard data, reliance has been placed on the judgement of experts expressed in workshops. Since the experts declare that severe problems exist in public health education and practice, confirmation by valid and reliable data is essential. The task is complex. Professional categories in public health are diverse, imprecisely delineated, and frequently overlapping. Personnel are employed in such diverse settings as government agencies, foundations, and private companies. Attempts to improve data on public health personnel depend on long-term collaboration among governments at all levels, educational institutions, and the private sector.

Shortages of Public Health Personnel

Previous reports to Congress on health personnel have summarized evidence that indicates shortages of public health personnel as well as other concerns. Recent studies of the environmental health work force provided in this report and a major report published by the Institute of Medicine (IOM) in 1988 further document the problems of educating public health professionals and maintaining an adequate work force (DHHS, 1988; IOM, 1988). The IOM study concluded that a major reason for inadequacies in the provision of public health services was lack of well qualified professionals. Furthermore, the study observed that "some schools have become somewhat isolated from public health practice" and declared that "schools of public health establish firm practice links with State and/or local public health agencies."

Large numbers of personnel working in environmental health, public health nursing, public health nutrition, health education, public health dentistry, and health administration have not received basic preparation concerning the theories, principles, and methods of public health. In addition, many public health professionals who initially were adequately educated have not had access to continuing professional education during their careers because of lack of proper materials, courses, and financial/workplace constraints. These factors, combined with the conclusions of the IOM study that employers are concerned that recent public health graduates are not receiving education relevant to practice in public agencies, strongly suggest there are serious deficiencies in education for public health personnel.

Shortages of public and community health personnel currently exist in the following specialties: epidemiologists, biostatisticians, several environmental and occupational health specialties, public health nutritionists, public health nurses, and physicians trained in public and preventive medicine.

Compounding the problem of shortages of public health personnel is that a declining number of physicians, scientists, and engineers are obtaining education in public health. These professionals are needed to address a wide variety of problems identified in Objectives for the Nation (DHHS, 1930). Physician epidemiologists are in particularly short supply. Engineers, toxicologists, chemists, and other scientists are needed to find solutions to numerous environmental health problems. Few nutritionists enter public health training, especially those pursuing doctoral education. Many public health problems are more severe in minority populations, yet few minority professionals choose careers in public health.

Trained public health personnel are needed to address current major health problems and issues. A brief description of these issues follows.

Environmental Health Education

Table IV-F-1

Environmental Health Professional Providing
Public Health Services, 1987

Additional Specialty	Supply	Need Added Training	Persons Needed
Air/Water	104,000	0	16,500
Milk/Food/Inst. Mgrs.	36,000	6,000	17,000
Hazardous Mgrs.	10,000	5,000	65,000
Occupational Hlth.	69,000	25,000	2,500
Other	16,000	1,500	20,200

A recent study concludes that there is currently a shortage of many environmental and occupational health professionals (DHHS, 1988). The study estimates that in 1987 there were 80,000 environmental health professionals and an additional 155,000 other professionals providing public health services (table IV-F-1). At least 40,000 of these 235,000 professionals need further training, and more than 120,000 additional professionals are needed.

According to a recent workshop on environmental health training, the system for educating environmental health professionals is experiencing many difficulties (DHHS, 1989a). The U.S. Public Health Service (PHS) was urged to take the lead in developing a national plan for education of a new cadre of environmental public health specialists and to convene a coordinating group on a regular basis to consider improvements in undergraduate, graduate, and continuing education. It was recommended that a portion of all funds appropriated for environmental activities be set aside for the education and training of personnel to implement these programs.

Health Promotion and Disease Prevention

Many of the Surgeon General's goals for health promotion and disease prevention by the year 1990 have not been met (DHHS, 1986). If the Nation is to meet a new set of objectives being developed for the year 2000, we must have an adequate supply of well trained health professionals with skills in health promotion and disease prevention (DHHS, 1989b). Toward this end, the Bureau of Health Professions (BHPr) conducted a series of studies in 1984. Recommendations were developed on faculty and curriculum development, student selection, accreditation and certification standards, and development of closer links between industry and the health profession education community. The recommendations represent a comprehensive strategy that remains relevant to obtaining national public health goals for the year 2000.

HIV/AIDS

The HIV/AIDS epidemic represents the most serious challenge to the public health system of the twentieth century. Major responsibility for this deadly and complex epidemic will fall on public health agencies. The public health work force increasingly will be responsible for a variety of activities related to HIV/AIDS, including acute, long term, and hospice care; financing of complex and expensive treatment for the medically indigent; evaluation of programs; working with the media and health professionals to educate the public, change behavior, and discourage spread of the epidemic; collecting accurate epidemiological data; and managing these programs in a cost effective manner. A prototype HIV/AIDS continuing education curriculum for public health professionals is being developed by the Bureau of Health Professions to encourage and accelerate education of the public health work force concerning HIV/AIDS through the AIDS Education and Training Centers Program and professional associations.

Substance Abuse

Substance abuse, in the form of cocaine, heroin, and various hallucinogens, is a public health problem of epidemic proportions. It threatens the youth of the United States, exacerbates other public health problems such as the HIV/AIDS epidemic, and demands the attention of properly educated and motivated public health professionals. While control of drug abuse must be the combined responsibility of government and the private sector, the public health work force at the local, State, and Federal levels increasingly will be involved in controlling the problem. This involvement includes effective public education to control demand for drugs; planning, financing, implementing, managing, and evaluating treatment programs that increasingly will become the responsibility of public health agencies; and working with other segments of government, such as law enforcement/prison, immigration, and custom authorities. The public health work force must be prepared to address the epidemic of drug abuse through basic educational preparation and professional development efforts.

Geriatrics

Providing comprehensive health services to the growing population over 65 years of age is complex and expensive. Public agencies are increasingly being required to plan, implement, and evaluate geriatric health care programs, especially for the medically indigent population. However, the public health work force has received very little training in the development and implementation of geriatrics activities. Curricula in schools of public health must be improved and training materials for the work force must be developed. The Bureau of Health Professions is developing an intensive short-term curriculum for practicing public health professionals that also can be used by the Geriatric Education Centers, schools of public health, and professional associations to help educate and sensitize the public health work force to issues and approaches to geriatric problems.

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Personnel for Health Care in Geriatrics

Impending changes in the age structure of the population, especially the growth of the oldest old, discussed previously in the section Aging Population, have important implications for the health care system. Rapid growth of the 85 and older group--expected to exceed 7 million persons by 2020--will produce a substantial rise in the number of frail and infirm individuals, and almost certainly will mean sharply increased demand for acute, chronic, and rehabilitative services. At the same time, the complex health care needs of adults of advanced age will require intensive diagnostic, treatment, and case management services. Such services are not always available today. Only 1,026 MDs classified themselves as specializing in geriatrics in 1986 according to the American Medical Association, up from 484 in 1976.

Personnel and Training Needs

The quality of education and training of health personnel is critical in determining quality of health care provided older adults. The attitudes and capabilities of health care practitioners affect treatment decisions, choice of care setting, and the range of services offered to the elderly, influencing the appropriateness and effectiveness of the health care older persons receive.

A perspective on personnel and training needs in geriatrics and gerontology is offered by the 1987 report on Personnel for Health Needs of the Elderly through the year 2020 (DHHS, 1987). Alternative estimates and projections, reflecting various types of practice, are included for geriatricians and for other medical specialists--notably those in primary care specialties--with advanced preparation in geriatric care. Depending on the assumptions, the projected need for geriatrically prepared physicians in 2020 could range from 14,000 to 29,000 full-time equivalent (FTE) geriatricians plus an additional 23,000 to 47,000 FTE primary care physicians with special competence in geriatrics. Psychiatrists are not included in these figures. It is estimated that 400-500 academic geropsychiatrists will be needed in 2020, with an additional 4,000-6,000 geropsychiatrists providing patient care.

In geriatric dentistry, it is estimated that 8,000-12,000 dental practitioners with appropriate preparation will be needed by 2020, of whom approximately 2,000 would be academic faculty and researchers.

Even if these requirements are met, those with appropriate preparation in geriatrics are likely to constitute a very small fraction of all practitioners by 2020, despite the fact that many if not most patients will be middle-aged or older adults. There is, therefore, a compelling need for continuing education offerings in geriatrics for current practitioners from all disciplines.

Obstacles to Growth

More effort is required in mobilizing educational resources to address the health care needs of older citizens. In order to prepare health professionals to respond appropriately to the needs of the elderly, significant obstacles must be overcome. They include too few qualified faculty members who serve as role models; difficulties in incorporating geriatrics into crowded curricula; uncertain and inadequate funding for geriatric education programs; overemphasis both in education and service on acute, highly technological in-patient care and underemphasis on health promotion, disease prevention, and long-term care; and institutional resistance to change.

Attitudinal barriers continue to impede the development of geriatric education. Negative attitudes towards geriatrics on the part of administrators and faculty constrain capacity building within health professions schools. And the perception of unrewarding patients, insubstantial professional challenge, low prestige, and low earnings potential discourages many health professionals from developing expertise in geriatrics or long-term care. It has been very difficult to attract physicians to geriatric residencies and fellowships.

The Federal Effort

The Federal effort to address these challenges focuses on providing education and training opportunities for faculty, researchers, and practitioners through programs sponsored by the Department of Veterans Affairs, the National Institute on Aging, the National Institute of Mental Health, the Administration on Aging, and the Bureau of Health Professions. Support for faculty development and career training in gerontology, funded largely through the Older Americans Act, began in the late 1960s, but Federal support for geriatric education is more recent. In 1983 what would subsequently become a nationwide network of Geriatric Education Centers was launched with the funding of four prototype centers at Harvard University, the State University of New York at Buffalo, the University of Michigan, and the University of Southern California. By the end of 1989, 38 centers were providing multidisciplinary geriatric training for health professions faculty, students, and community practitioners in 27 States and the Commonwealth of Puerto Rico.

In 1982 the Area Health Education Center (AHEC) program began the first Geriatric AHEC at the University of Maryland to develop student and faculty geriatric skills in nontraditional health care settings. The Maryland AHEC has also explored the feasibility of physician house calls for the elderly in underserved urban areas. Another effort funded by the AHEC's is Colorado's development of a dental rotation program in rural areas specifically for the elderly. And Connecticut has developed interdisciplinary training for personnel to monitor the health of low-income elderly at congregate meal sites.

Academic Resources

Programs such as these create an excellent base for resource development, but much more effort is needed to build a cadre of academic leaders in geriatrics and gerontology. Once an academic infrastructure is in place, educators will face a twofold challenge: First, preparing geriatric specialists including researchers, clinicians, consultants, in-service educators, and long-term care personnel and second, communicating the expanding knowledge base in geriatrics to health professions students and practitioners who do not plan to specialize in geriatrics. The need to impart a basic understanding of geriatrics and gerontology to health professionals in general--not just to those who specialize in aging--arises from two important facts. First, as the population ages, the "typical" patient is likely to be elderly, so that almost all primary care physicians, nurses, and other health personnel will serve substantial numbers of older adults. Second, medical research has produced advances such that many conditions once accepted as inevitable consequences of old age can be treated or alleviated.

Expansion of Geriatric Medicine

Modest growth is occurring in the number of physicians in all specialties, particularly in primary care, who are expanding their levels of expertise and skills in geriatric medicine, but the numbers are still very small.

However, two events occurred in 1988 that more clearly establish the position of geriatrics in American medicine. First, the American Board of Internal Medicine and American Board of Family Practice awarded a "Certificate of Added Qualifications in Geriatric Medicine" to internal medicine and family medicine physicians who passed a qualifying examination. Over 4,200 physicians sat for the first examination and over 2,400 passed. (This examination does not establish a separate, additional subspecialty.) The American Board of Psychiatry and Neurology is establishing a similar category for special qualification in geriatric psychiatry. By focusing efforts within the mainstream medical specialties, it is expected that geriatrics will become an important practice area in the field of medicine (DHHS, 1987).

Second, the Accreditation Council for Graduate Medical Education began to accredit geriatric residency programs. At present, 43 Internal Medicine and 14 Family Practice programs are accredited (American Board Internal Medicine, 1989). Ninety-seven percent of medical schools have required curriculum in geriatrics and 117 out of 127 offer geriatric electives (AAMC, 1989). In the academic year 1987-88, there were 103 geriatric medicine and geropsychiatry fellowship programs with 295 positions (Beck, 1988).

Nursing Personnel

Very few of the nation's 1.6 million professionally active registered nurses have in-depth preparation in gerontological nursing. According to the 1988 National Sample Survey of Registered Nurses, about 3,500 had master's or doctoral degrees in which the primary focus was clinical practice with specialty in geriatrics. About 2,100 had training as geriatric nurse practitioners, 1,000 of whom had completed certificate programs and the rest, master's degree programs. Most of these nurses are consultants or clinical nurse specialists. Many work in acute care, for nearly all hospitals serve large numbers of elderly patients. Relatively few nurses with advanced gerontological preparation are found in long-term care: 107,809 registered nurses were employed in nursing homes in 1988.

Long-term Care Personnel

Formal long-term care services are delivered largely by nursing aides, homemaker-home health aides, and other direct caregivers working under the supervision of nurses, therapists, and other health professionals. Health professions education has yet to address the need to prepare physicians and nurses for the challenges of home and community-based care. Only 14 schools of nursing have master's degree programs in home health care.

For the vast majority of older people who live in the community, services provided by family members and other informal caregivers are of paramount importance. As health care at home becomes increasingly complex and technology-dependent, informal caregivers' need for professional direction and support will grow, creating a need for geriatric education for the health and human service professionals who assist them.

Serious staffing problems exist in long-term care. Recruitment difficulties have persisted and are generally attributed to low pay levels, image problems within the profession, and overwork due to understaffing. The current nationwide shortage of physical therapists, nurses, and other health professionals has intensified recruitment difficulties in long-term care. Prospects for improvement are poor over the next decade, given the declining supply of youth and the downturn in enrollments in health professions education. Employers and educators need to work together to attract the best people possible to health careers in general, and to aging and long-term care in particular.

Widespread concern about the quality of nursing home care led to enactment of extensive provisions on nursing home reform in the Omnibus Budget Reconciliation Act of 1987. Meeting the legislative mandate for nurse aide training, testing, and certification will spur demand for trainers and training materials. Experience suggests that staff training, effective supervision, and a good work environment can make a difference. The positive effect of staff training has been observed in a number of facilities, among them nursing homes that have served as clinical sites for health professions students. (Mezey, 1988; Kane and Kane, 1987).

Geriatric Aspects of Health Professions Education

Geriatric education places special emphasis on the changing psychosocial as well as the medical needs of individuals as they grow older. Traditionally, health professions education has focused on the biomedical aspects of care with an emphasis on specific diseases and organ systems. This "medical" model is not appropriate to guide care for most elderly patients, who instead may need a multidisciplinary approach that focuses on overall needs. Older persons are often (but not always) afflicted with multiple conditions that restrict activities of daily living and require a mix of services. For these patients, particular attention needs to be paid to managing chronic conditions--helping patients adjust to their limitations and maintain daily functioning within their own context of living arrangement, family, and social support.

Since the older population is highly diverse with respect to health status, social supports, and access to needed services, health professions educators need to prepare students and practitioners for encounters with older adults in a variety of situations. Some older adults will be vigorous and independent, but have acute conditions, while others will be chronically, mentally, or physically impaired. To achieve awareness of the many ways in which old age manifests itself, geriatric training needs to incorporate clinical instruction in a variety of settings, community-based as well as institutional, including retirement housing, senior centers, community health centers, home care programs, rehabilitation centers, nursing homes, and hospitals.

Fragmentation of health care received by many older patients is a serious problem and is often compounded by a lack of communication among providers that can lead to inappropriate treatment. Multidisciplinary and interdisciplinary team training can help overcome the obstacles to optimal care (a result of a fragmented reimbursement and service delivery system) as has been demonstrated in the national channeling demonstration (i.e., expanded formal community care) and numerous other community care demonstrations (Health Services Research, 1988; Kemper et al, 1987).

The Complex Problems of Geriatric Health

Mental Health

Addressing the mental health needs of the elderly is particularly complex because physical and mental illness often interact with each other. Prescribed or over-the-counter medications can also adversely afect mental status of the elderly. Mental and behavioral problems found among older adults--cognitive impairment, confusion, memory loss, depression, anxiety, sleep disorders, irritability, and agitation--frequently are unrecognized by health practitioners. In nursing homes, where many residents exhibit mental or behavioral disorders, there is a heavy dependence on drugs. Mental health counseling, behavior modification therapy, and psychotherapy are frequently not available. In order to provide appropriate care to the large and growing number of older adults with mental, emotional, or behavioral disorders, it will be necessary to train nursing home aides, home health aides, and family caregivers in mental health issues. This in turn will require greater attention to mental health and aging in the educational preparation of physicians, pharmacists, nurses, therapists, social workers, long-term care administrators, and others.

Substance Abuse

As attention becomes increasingly focused on the nation's substance abuse problems, it is important to recognize that such problems also exist among older adults, particularly in the forms of mismedication and alcohol abuse. The Inspector General, DHHS, reported in 1989 that his office had found "a widespread problem of mismedication among older adults," which could be characterized due to its severity as "the nation's other drug problem" (DHHS, 1989). The study found that approximately 243,000 older individuals are hospitalized annually for adverse reactions to prescribed or over-the-counter drugs. It is important that physicians, nurses, and other practitioners become aware of these problems through training in geriatric pharmacology and experience with team approaches involving pharmacists. Opportunities to do so are increasingly available. For example, the Hartford Foundation recently funded an initiative to improve the patterns of prescribing medications for the frail elderly, and many Geriatric Education Centers sponsor courses, workshops, or symposia on such topics as "Drug Therapy and the Aged Patient" or "Alcohol Abuse and Alcoholism in the Later Years of Life."

Oral Health

While the physical health of many older people is better than that of their parents or grandparents, their oral health is greatly improved as well. Because older people retain more of their teeth and hold higher expectations for oral health than in the past, demand for a wide range of dental services will grow. Although most older people have treatment needs similar to the general adult population, physiologic, psychological, and medical conditions necessitate a more extensive and sophisticated level of care. Dental care providers need special knowledge and skills to deliver appropriate care to the older person, whether ambulatory, dependent, frail, medically compromised, or mentally impaired. Dental care providers should be prepared to interact with other members of the health care team to integrate dental care with medical care and social services.

"Healthy Aging"

It is axiomatic that "an ounce of prevention is worth a pound of cure." All older individuals should have access to health promotion/disease prevention services. As the more health conscious baby boom generation matures, the need will increase. The concept of "healthy aging" has become a major emphasis of geriatric and gerontological research, and the notion of preventive care for the elderly is gaining recognition (Hazzard, 1983; Lavizzo-Mourey et al, 1989). With the 1979 Surgeon General's Report and 1988 Surgeon General's Workshop on Health Promotion and Aging, health professionals' attention has been drawn continually to opportunities to positively influence older adults' health through early intervention conditions ranging from cigarette smoking to hypertension (DHEW, 1979; DHHS, 1988). Public as well as professional interest in a clinical prevention approach to geriatric care is likely to increase with the release in 1990 of study findings by the Institute of Medicine's Committee for Health Promotion and Disability Prevention for the Second Fifty. Recommendations emanating from such blue-ribbon panels should be incorporated into the training of health professionals and acted in practice.

Problems Associated with Minorities and Geographical Location

Older minority individuals frequently reflect the additional burdens of higher disease rates resulting from the consequences of neglect and poverty. Barriers to access are a problem for many minority and disadvantaged populations. Special efforts need to be made to attract, train and retain minority health professionals, administrators, and allied health personnel to bridge the cultural and language barriers that frequently impede effective treatment and care for minority elders.

The distribution of the nation's older population is not uniform across the country. Almost half of the population 65 years of age or above live in eight States: California, New York, Florida, Pennsylvania, Texas, Illinois, Ohio, and Michigan. Some boast unusually large concentrations of elderly: Florida, with nearly 18 percent of residents over the age of 65, is close to the proportion expected nationally in 2020. A number of predominantly rural States--among them Iowa, Missouri, Kansas, and Nebraska--have above-average concentrations of elderly. Finally, among the States anticipating exceptionally rapid increases in elderly populations between now and 2020 are North Carolina, Arizona, and New Mexico, favorite destinations of retirees (U.S. Senate, 1988). Resources aimed at improving the geriatric qualifications of health care personnel need to target areas of greatest need, assuring that training programs in geriatrics and gerontology reach regions with very large numbers of older adults as well as isolated and underserved communities, urban as well as rural.

Communicating Research

If the needs of the elderly are to be addressed effectively through improved education and training of health care personnel, greater emphasis must be placed on (1) changing practice patterns and (2) discarding outdated approaches to health care delivery. One way of assuring that aging-related research finds its way into clinical practice is by forging stronger links between academic institutions and the communities and practitioners they serve.

Models of collaboration developed under various geriatric initiatives supported by the Bureau of Health Professions demonstrate the efficacy of such approaches. One example is Iowa's Rural Elderly Outreach Program, a collaborative effort of an area agency on aging, a community mental health center, and the Iowa Geriatric Education Center. The project has a twofold purpose: to provide and evaluate mental health services for underserved rural elderly, and to educate health care practitioners about the rural elderly's diverse health and social service needs (Buckwalter et al, 1988). Rural elders are the focus of many AHEC activities as well. Continuing education for caregivers in rural areas is one example. Collaborative efforts between AHEC's and other agencies include a model project in North Carolina, created at the request of the local county government, for a case management system for older persons involving assessment, referral, and coordination of community services (McDonald, 1984).

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Underrepresented Minorities in the Health Professions

Increasing the numbers and percentages of persons from underrepresented racial/ethnic minority groups in health professions schools/programs and ultimately among the supply of health professionals has been a goal of many public and private organizations for nearly two decades. During that period a number of significant changes occurred in the supply and distribution of health care providers. Numbers of practitioners in most professions have increased to record high levels and there is evidence that some past problems with specialty and geographic distribution of health care personnel are being resolved (DHHS, 1988a).

Despite these achievements, which have resulted from public and private efforts since the late 1960s and the early 1970s, underrepresentation of certain racial/ethnic minority groups among the supply of health care personnel has persisted. Although data on minority health care personnel are extremely limited and available estimates must be used with care, percentages of Black, Hispanic, and American Indian health care providers clearly remain significantly below percentages of these groups in the general population.

The Supply of Underrepresented Minority Health Personnel

Lack of data precludes discussion of recent health occupation trends for any racial/ethnic minority groups other than Blacks and Hispanics. Available data show that, although changes have been slow to occur and underrepresentation still exists, some progress has been made in increasing numbers of minority health care personnel. For example, the 1970 Census of Population numbered the supply of Black physicians at about 6,000 and estimates from the Bureau of Health Professions (BHPr) indicated that by 1985 that number had more than doubled to approximately 15,600. The number of Hispanic physicians is estimated to have increased by more than 70 percent during that period, from 10,300 in 1970 to 17,600 in 1985 (Bureau of Census, 1973, DHHS, 1986). There is also evidence that similar gains were made in dentistry and pharmacy. However, these increases have not been sufficient to substantially increase the proportion of these groups in the total supply of practitioners nor to levels equal to their proportion in the population. In 1985 Black and Hispanic physicians were only about 3 percent each of the total supply of physicians, but constituted approximately 12 and 7 percent of the total U.S. population.

According to the data in table IV-H-A-1 there is considerable variation in the numbers of Black practitioners in the various health occupations. Blacks are more likely to be employed service occupations and technician positions than in professional occupations. Nearly one-third of the supply of nursing aides, orderlies, and attendants are counted as Black by this source while only 2 percent of dentists and slightly less than 4 percent of physicians are Black, a sharp contrast to the 12 percent that Blacks constituted of the general population in 1987. In general, the variation in the numbers of Hispanics these occupations is not as wide as that of Blacks. Nevertheless, their representation in most occupations shown in table IV-H-A-1 is below the 8 percent that they were of the general population in 1987.

It has been suggested that small numbers of minority health care providers may be a factor in poorer health status of racial/ethnic minority populations as compared with the non-minority population. Some analysts have observed that increasing the number of underrepresented minority health care providers increases the availability of health care providers to low income and minority populations, who traditionally have had difficulty in obtaining adequate health care. (DHHS, 1985a, Hanft and White, 1987; DHHS, 1988b).

Because of the scarcity of minority health care providers, most people from minority populations receive health care from practitioners from other racial/ethnic groups. In 1985 there were an estimated 54 Black physicians for every 100,000 Blacks in the population and 104 Hispanic physician for every 100,000 Hispanics (DHHS, 1986). The physician to population ratio for the U.S. as a whole in that year was 220 for every 100,000. Several studies in recent years have shown that underrepresented minority practitioners are more likely to locate in areas where substantial percentages of people of their racial/ethnic background live, that they are more likely to locate and practice in medically underserved and poverty areas, and to serve low income patients (Lloyd et al, 1978; Keith et al, 1985; DHHS, 1985b; Warren, 1988). Thus, impetus to increase the number of underrepresented minority practitioners stems not only from the desire to assure equal access to health professions training for all population groups, but also from a need for more practitioners to provide health care to minorities and other disadvantaged populations.

The relatively small numbers of underrepresented minority health professionals not only lessen their availability to provide care to their communities, but also diminish their availability to participate as faculty in schools that train minority health professionals and to work as scientists and researchers in studying problems that affect their communities.

Underrepresented Minorities in Health Professions Schools/Programs

There is a continuing underrepresentation of minorities among persons training for careers in the health professions. Aside from some year to year declines for some groups, the general trend in numbers of underrepresented minorities training for careers in the health professions has been upward. Recent growth has not been as rapid or substantial as during the early 1970s although the numbers of minorities enrolled in health professions training programs have continued to increase.

However, the increases that have occurred have not been sufficient to bring underrepresented minority enrollments to parity with their share of the population. As figure IV-H-1 illustrates, the number of Black, Hispanic, and American Indian students enrolled in schools of medicine (allopathic and osteopathic), dentistry, pharmacy, podiatric medicine, and optometry in 1987-88 was triple the number in academic year 1971-72. Despite this increase these students still constituted only about 12 percent of all students enrolled in these schools in 1987-88. Blacks and Hispanics together constituted about 20 percent of the population in 1987.

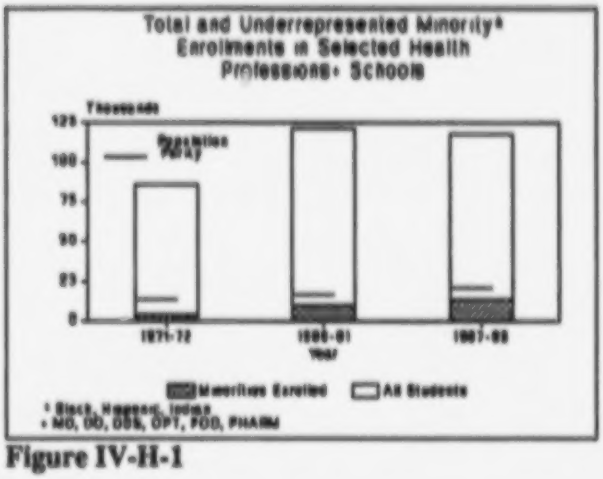

Figure IV-H-1

A number of factors have caused the persistent underrepresentation of minority health professions trainees. They include: inadequate academic preparation at the secondary school level (which limits the pool of qualified applicants); inadequate or inappropriate career counselling; admission policies of some health professions schools/programs; relatively high attrition rates after matriculation; and substantial costs of obtaining education as a health profession. All of these factors and others have combined over the years to serve as barriers to increasing the number of students from underrepresented minority groups to levels such that their percentages among students bodies of health professions schools would be equal to their percentages in the population.

Programs to Increase Minority Representation

It has become evident that these barriers are not self-reversing nor quickly and easily removed. Helping minority students to overcome these obstacles requires providing them with appropriate information, preparation, motivation, and opportunities at all stages of the educational process. Studies have indicated that the pool of students from which most health professions applicants will emerge appears in elementary school, is well defined by the ninth grade, and is essentially complete by the twelfth grade. Such studies have stressed the importance of targeting strategies to increase the size of the initial scientific/mathematical pool (from which minority health professionals will eventually come) before and during high school (Baratz et al, 1985). While the early school years have been identified as particularly critical for affecting improvements and increases in the underrepresented minority trainee pool, efforts are needed and have been conducted at all points along the educational continuum.

Since the early 1970s a number of intervention programs have been sponsored by public and private agencies to assist minority and other disadvantaged students in overcoming the obstacles to becoming health care professionals. For a number of years the principal Federal effort to increase number of minority students in health professions training has been the Health Careers Opportunity Program (HCOP).

HCOP, established in 1977 to carry out the legislative intent of Section 787 of the Public Health Service Act, and its predecessor, the Special Health Career Opportunity Grant (SHCOG), represent 17 years of continuous Federal efforts to improve access to health careers for minorities and other disadvantaged individuals. Awards are made to health professions and allied health professions schools, undergraduate institutions, and non-educational health-related institutions. Projects funded under this program include such activities as development of materials targeted for provider training; preliminary education activities prior to entering a health professions or allied health training program; activities to facilitate entry into health professions training programs; and retention activities for enrolled health professions students.

Additionally, 20 percent of HCOP appropriated funds in any one year are earmarked for financial assistance for disadvantaged allopathic medicine, osteopathic medicine, and dentistry students in exceptional financial need. Nursing efforts within the Bureau of Health Professions are addressed under nursing special project authority. Several studies have indicated the positive influence of both publicly and privately sponsored programs on numbers and percentages of minorities applying to, matriculating in, retaining in, and graduating from health professions training programs (Baratz et al, 1985; Payne et al, 1986; and Warren, 1988).

Recent trends in numbers and percentages of persons from racial/ethnic minority groups who have sought and obtained training in the health professions may also indicate the effects of such programs. In general, minority enrollments and graduates have not followed overall trends during the 1980s. Whereas the general trend of this decade has been towards stabilization or decline in enrollments and graduates, the numbers of minorities in most professions have generally continued to increase (with the notable exceptions of declines in the number of Blacks enrolled in schools of dentistry and all minorities enrolled in nursing programs). As table IV-H-A-2 illustrates, these increases have been greatest for Hispanics and Asians. During the period from academic years 1980-81 to 1987-88 increases in the number of Hispanics ranged from 29 percent in schools of allopathic medicine to 300 percent in schools of osteopathic medicine. Increases in the number of Asians enrolled in health professions schools during this same period ranged from 52 percent in schools of veterinary medicine to 243 percent in schools of allopathic medicine. The relative gains made by Blacks and American Indians were more modest ranging from 8 percent (allopathic medicine) to 115 percent (podiatric medicine) for blacks and from 7 percent (allopathic medicine) to 90 percent (osteopathic medicine) for American Indians.

In contrast to other minority groups the number of Blacks enrolled in schools of dentistry during this period declined 4 percent. In nursing all minority groups followed the pattern of decline in total number of students enrolled during this period. However, declines in total nursing school enrollments must be interpreted with some caution since trends in total nursing enrollments may incorporate changes in program lengths and may not solely reflect diminution of the student body.

The declines in the total number of students enrolled and the continued growth in the number of minority students enrolled has resulted (with a few exceptions) in an increased share of students from most racial/ethnic minority groups among the student bodies of health professions schools during the 1980s. However, all groups except Asians failed to reach population parity. Moreover, although the numbers of new minority health professionals (recent graduates from health professions schools/programs) increased during the 1980s (see table IV-H-A-3), the growth has not been sufficient to substantially increase the supply levels of these practitioners so that they would begin to approach parity.

Projections of the future supplies of Black and Hispanic physicians, dentists, and pharmacists indicate that, although these practitioners are expected to grow at a much faster rate than the total supplies of practitioners in those professions, their numbers in the year 2000 will be less than one-third of the numbers required for population parity. Moreover, because the growth in the Hispanic population is expected to be greater than the growth in the supply of health care practitioners, they are not expected to achieve population parity in the number of practitioners (DHHS, 1986).

Improvements in retention rates for minorities already enrolled in health professions schools/programs probably offer the most effective means for increasing the number of underrepresented minority health care professionals in a relatively short time span. Even in schools of allopathic medicine where retention rates are probably higher than for other professions, the percentage retained or graduated by the fourth year of medical school is 89 percent, compared with 97 percent for all students (AAMC, 1988). Congress, recognizing the immediate gains in the supply of underrepresented minority health professionals to be realized by improving retention in training programs, has issued a mandate for the establishment of a supplemental grant program. The grants will be awarded to schools of medicine, osteopathy, dentistry, veterinary medicine, optometry, podiatry, pharmacy, and public health that demonstrate rates of graduation of students from disadvantaged backgrounds that are at least 90 percent of the graduation rates for nondisadvantaged students.

The issue of how to increase underrepresented minority enrollments in health professions schools/programs is long standing. The prerequisite for any successful nationwide effort to solve a persistent problem is a national will to do so. It is obvious that this problem is not amenable to quick resolution, but will require the continued cooperative efforts and commitments of the government, schools, and other organizations and agencies that have developed their own courses of action in this area.

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Table IV-H-A-1 Employed Civilians in Selected Health Occupations and Percent Black and Hispanic, 1987

	Total Employed	Percent of Total	
		Black	Hispanic
Total 1/	5,956,000	13.8	5.8
Health Diagnosing Occupations 1/	793,000	3.0	4.5
Physicians	514,000	3.7	5.5
Dentists	160,000	2.1	3.3
Health Assessment and Treating Occupations 1/	2,148,000	7.7	2.9
Registered Nurses	1,588,000	7.7	2.6
Pharmacists	153,000	3.0	1.9
Dietitians	63,000	29.5	5.5
Therapists*	285,000	6.5	3.5
Inhalation Therapists	60,000	9.0	8.9
Physical Therapists	75,000	6.1	4.0
Speech Therapists	73,000	2.8	--
Health Technologists and Technicians 1/	1,142,000	13.8	3.5
Clinical Lab Technologists and Technicians	259,000	13.8	3.1
Dental Hygienists	74,000	1.7	2.8
Radiologic Technicians	127,000	8.5	2.7
Licensed Practical Nurses	406,000	18.3	2.7
Health Service Occupations	1,873,000	25.5	7.0
Dental Assistants	169,000	5.8	10.3
Health Aides, except Nursing	380,000	15.8	6.9
Nursing Aides, Orderlies and Attendants	1,324,000	30.8	6.6

Source: Bureau of Labor Statistics. Employment and Earnings. January 1988.

1/ Includes occupations not shown separately.

Table IV-H-A-2. Total Enrollments in Selected Health Professions Schools/Programs by Racial/Ethnic Minority Group 1980-81 to 1987-88

	1980-81					1987-88 1/2/				
	All Students	Black	Hispanic	Asian/ Pacific Islander	American Indian	All Students	Black	Hispanic	Asian/ Pacific Islander	American Indian
					Number					
Medicine										
Allopathic	65,189	3,708	2,761	1,924	221	65,300	3,995	3,566	6,595	237
Osteopathic	4,940	94	52	87	19	6,586	122	208	287	36
Dentistry	22,842	1,022	519	1,040	53	17,094	984	1,038	2,326	63
Pharmacy 3/	21,628	945	459	1,035	36	21,424	1,735	1,055	2,000	45
Podiatric Medicine	2,577	110	39	69	6	2,790	236	89	151	8
Optometry	4,540	57	80	243	12	4,509	117	139	410	22
Veterinary Medicine	7,777	176	89	79	32	8,558	200	196	120	47
Nursing (RN only)	219,188	14,365	5,785	*	*	165,596	11,999	3,477	*	*
Public Health	6,047	379	242	393	88	7,942	433	452	304	63
					Percent					
Medicine										
Allopathic	100.0	5.7	4.2	3.0	0.3	100.0	6.1	5.5	10.1	0.4
Osteopathic	100.0	1.9	1.1	1.8	0.4	100.0	1.9	3.2	4.4	0.5
Dentistry	100.0	4.5	2.3	4.6	0.2	100.0	5.8	6.1	13.6	0.4
Pharmacy 3/	100.0	4.4	2.1	4.8	0.2	100.0	8.1	4.9	9.3	0.2
Podiatric Medicine	100.0	4.3	1.5	2.7	0.2	100.0	8.5	3.2	5.4	0.3
Optometry	100.0	1.3	1.8	5.4	0.3	100.0	2.6	3.1	9.1	0.5
Veterinary Medicine	100.0	2.3	1.1	1.0	0.4	100.0	2.3	2.3	1.4	0.5
Nursing (RN only)	100.0	6.6	2.6	*	*	100.0	7.3	2.1	*	*
Public Health	100.0	6.3	4.2	6.5	1.5	100.0	5.5	5.7	3.8	0.8

Source: Bureau of Health Professions. Minorities and Women in the Health Fields, 1989 Edition . (Forthcoming)

* Not Available

1/ Allopathic medicine, dentistry and veterinary medicine data are for 1988-89.

2/ Nursing and Public Health data are for 1985-86.

3/ These are students in the final three years of professional pharmacy education, excluding any students in pre-pharmacy years.

Table IV-H-A-3 Graduates from Selected Health Professions Schools/Programs by Racial/Ethnic Minority Group, 1979-80 to 1987-88

	1979-80 1/					1987-88 2/				
	All Students	Black	Hispanic	Asian/ Pacific Islander	American Indian	All Students	Black	Hispanic	Asian/ Pacific Islander	American Indian
					Number					
Allopathic Medicine	15,135	768	369	395	33	15,630	850	601	1,119	58
Dentistry	5,193	190	119	197	14	4,519	227	221	459	14
Pharmacy	7,210	249	277	292	8	5,513	299	258	372	8
Veterinary Medicine	*	*	*	*	32	2,212	41	38	24	3
Nursing (RN only)	68,520	3,571	1,568	*	*	65,845	4,233	1,854	*	*
Public Health	2,923	182	132	113	25	2,703	150	95	112	20
					Percent					
Allopathic Medicine	100.0	5.1	2.4	2.6	0.2	100.0	5.4	4.0	7.4	0.4
Dentistry	100.0	3.7	2.3	3.8	0.3	100.0	5.0	.9	10.2	0.3
Pharmacy	100.0	3.5	3.8	4.0	0.1	100.0	5.4	4.7	6.7	0.1
Veterinary Medicine	*	*	*	*	*	100.0	1.9	1.7	1.1	0.1
Nursing (RN only)	100.0	5.2	2.3	*	*	100.0	6.4	2.8	*	*
Public Health	100.0	6.2	4.5	3.9	0.9	100.0	5.5	3.5	4.1	0.7

Source: Bureau of Health Professions. Minorities and Women in the Health Fields, 1989 Edition. (Forthcoming)

* Not Available

1/ Nursing data are for 1980-81.

2/ Pharmacy data are for 1986-87, and Nursing and Public Health data are for 1985-86

Chapter V

HEALTH PROFESSIONS DATA AND METHODOLOGY

Introduction

The analytical and forecasting activities that underlie health professions policy decisions require current, high quality data to answer policy questions. Sophisticated analytical and forecasting methodologies have little value unless relevant data are available to implement them. Methodologies and data need to be developed together, with an emphasis on data development because methodology can be adapted to available data.

Concerns over inadequacy and obsolescence of data and associated problems in methodology have grown in recent years as the pace of analytic data development within government and the private sector have slowed. Although there has been some improvement in the data available from such private sources as professional associations, data shortcomings (e.g., unavailability, frequency, specificity) continue to be a problem.

As the Nation enters the 1990s, new issues require appropriate analyses and means of anticipating future needs and responding quickly to prevent shortages. Presently, for example, some basis for identifying the effects of AIDS on health resource requirements is critical to our Nation's ability to meet this severe problem. Other changes in disease incidence and care technology also need to be examined for their impact on health personnel. The reduction in cigarette smoking and the increased attention to other health promotion activities such as improvements in nutrition and exercise should have significant impact on future disease patterns. Because health professions policies and interventions require considerable time to become effective, long-range projections of personnel needs must be developed, 15 to 30 years into the future.

Data Availability

In the mid-1970s, most estimates of current and future supplies of the health professions were obtained mostly from inventories of licensed professionals. These censuses provided details of the age, sex, and geographic distribution of health personnel. Activity, relocation, and retirement rates used to forecast the future supply of personnel were derived from them. Typically, these data were collected through State licensing boards at the time of license renewal A complete set of national data for an occupation could take 2 or 3 years to complete, due to varying State renewal dates.

Inventory data for physicians and dentists have been developed by the professional associations. For other professions, such as nursing, there were major public/private joint efforts. In optometry, podiatry, and pharmacy, most of the support for inventories came from the Federal government. Forecasts of requirements for health professionals were mainly estimated from Census population and income estimates, employing utilization rates from the National Health Interview Survey. Neither data nor forecasting models existed for public health or for most of the allied health professions.

Since 1980, however, there have been no inventories of health professionals with participation by the Federal Government. As a result, these data are available only from those professional associations which have sufficient resources to collect them. The Bureau of Health Professions (BHPr) has supported survey planning and post-survey data processing on some occasions, but resources are unavailable to support complete inventories.

Present data availability is highly uneven. The American Medical Association (AMA) data on MDs continue to be timely, of excellent quality, and generally available. The American Osteopathic Association has intensified data collection on Doctor of Osteopathy (DO) physicians. The American Veterinary Medicine Association has been developing a sound database and the American Dental Association periodically updates dentist data. Other than those on this short list, however, the professional associations find it very difficult to maintain current data on their professions. Some have only partial data on their members. Scanty data on minorities in the health professions hinders analysis and policymaking in this area.

Sample Data

Sample surveys of health professionals are not totally adequate substitutes for complete inventories, but are often a key source of information for analytical and forecasting efforts. Their major limitation is that they do not provide adequate information on geographic distribution, particularly county-level data utilized in the analysis of urban/rural differences and small area shortage patterns. In the case of RNs and LPNs, sample surveys funded by the Bureau of Health Professions have used large enough samples to enable reasonable estimates for most States. Congressional legislation specifically requires State-level forecasts only of supply and requirements for nursing, and consequently the funding of these sample surveys has been given priority. With continually rising costs, however, these surveys strain available resources.

Sample data collected by some professional associations are adequate for monitoring national trends. The American Medical Association now continually monitors the Nation's practicing MDs through sample surveys. The American Dental Association's Survey of Dental Practice, conducted every 2 years, provides time-series data extending back to the late 1940s. Other health professions also conduct sample surveys, but generally not as far back and with more variable intervals between surveys. There are even occasional sample survey data on allied health professionals, most notably physical therapists for whom sample surveys have been conducted by the association for many years. For public health, even sample data are sparse.

Availability of Federal Data

There have been significant developments in Federal data collection efforts upon which the health professions analytical program depends. Both the National Center for Health Statistics (NCHS) and the National Center for Health Services Research (NCHSR) have increased the time intervals between important surveys and have not initiated new data collections. Similarly, data from the Bureau of Labor Statistics (BLS) and the Bureau of the Census have been slower to appear and their coverage has not been expanded significantly. By contrast, there have been some improvements in the availability of private sector data. The American Hospital Association (AHA) has greatly expanded the data collected in its annual hospital survey and has added bed and patient day data for many units of the hospital, where only overall facility totals were once collected. Initiated with Bureau of Health Professions support, staffing data for over 30 types of personnel are now being collected. These data are the most important source of information on allied health occupations. Another important subject of data collected in the AHA survey is the hospital's admitting staff, by specialty and board certification status. The AHA has also conducted a special survey of RN personnel.

Educational Data

Unlike the problems that exist in practitioner data, there has been a gradual improvement in health professions educational data. All school associations now gather and publish data on schools, programs, and students; and most provide good data on student characteristics. A notable improvement over recent years has been the reporting of minority information. The greater availability of educational data stems in large part from the smaller number of reporting units and from the schools' or associations' ability to capture the information as part of their normal administrative processes. In some areas, such as student finances and indebtedness, data are more difficult to obtain. Administrative data from allied health education programs are especially difficult to obtain. This results from difficulties in identifying which programs to include as well as lack of a single strong association to organize the process. The most difficult educational data to obtain are costs of providing health professions' education as typically these are intermingled with other costs.

Forecasts

Increased demand for forecasts of the national economy has led to projections of income that provide an important foundation for health sector forecasts. Typically, these forecasts provide income and economic activity by sector, frequently disaggregated to county level. Similar forecasts are not available for hospital patient days and nursing home residents, however, since demand by businesses for these data appears to be low. The increase in commercially available forecasts is helpful, but not a complete solution to the need for underlying forecasts of health sector conditions that are the basis of projecting health professions requirements.

Reimbursement Data

The health insurance industry's proprietary data on reimbursements have generally not given estimates of care use by geographic area, but the change in Medicare reimbursement to prospective payment based on diagnosis related groups (DRGs) provides an alternative source. By providing primary diagnosis classification for nearly all hospital visits by persons 65 years of age and older, DRG data captures over half of disease-related hospital care. In future years these data will provide a basis for assessing staffing-related care delivery differences.

Overall, developments in data health personnel in the 1980s have been mixed, with declines in public support compensated by gradual improvement of non-public data development. Several disciplines do not have requirements forecasts included in this report and for other disciplines both supply and requirements forecasts are extended only to the year 2000. In a number of cases the information underlying forecasts differs little from what was presented several years ago. As a result, forecasts have to be extrapolated from earlier periods rather than being based on current developments. Consequently, they can be extended only for short time periods and are less accurate than those based upon current data.

Analytical Methodologies and Projections

New analytic approaches are required because of the emergence of new forces affecting the professions and the unavailability of needed practitioner data. Outside of medicine, osteopathy, registered nursing, and dentistry the databases to support forecasting are weak. Nonetheless, there is still considerable policy interest in these professions and the changes affecting them. The IOM recently released studies critical of the minimal information available on public health and allied health professions. The Council on Graduate Medical Education has become concerned over the lack of forecasts of supply and requirements by medical specialty. To respond to these needs, the Bureau of Health Professions is exploring alternative means for developing sound estimates of the present supply and distribution of health practitioners. Discussions are underway regarding partial support of consortia of organizations to develop better data for a variety of health professions.

Another approach is the "synthetic" estimation of the distribution and characteristics of health professionals based upon other Federal data collections such as those of the Census Bureau, Bureau of Labor Statistics (BLS), and Internal Revenue Service (IRS). All of these data sources have limitations and are not entirely compatible, but the use of such multiple sources allows for adjustments to be made to alleviate some of the problems. For example, the decennial Census data contains a large sampling error for smaller States. More seriously, it also has major errors resulting from the self-reporting of occupations. But comparison of Census, professional association, and BLS data may provide a means of making acceptable estimates for professions where self-reporting errors are not known to be a problem. It is far from certain that it is a realistic alternative to derive more than a small portion of health professions data from synthetic estimation, however.

A potentially severe data problem exists in the area of nursing, where there have been large sample surveys of the Nation's RN supply every three to four years since 1977. A sample survey of LPNs was conducted in 1983, the only time this has been done. To continue to support these surveys would require use of almost all currently available funding for health professions data, which would severely limit data collection and analytical activities for the other health professions. Although it may be possible to estimate the numbers of RNs, by type, through synthetic means and to use smaller sample surveys to gather national RN characteristics data, the precision of the data would undoubtedly be significantly decreased but perhaps without substantially reducing costs. An aggregate of two or more sample surveys could possibly provide a basis to impute RN characteristics to the State level. Efforts are also underway in the Bureau of Health Professions to explore a longitudinal database supported jointly by public and private efforts, as recommended by the Secretary's Commission on Nursing.

Along with the need to fill data gaps, the scope of the Bureau's analysis and forecasting activities needs to be widened. Until recently, health care delivery has been dominated by economic effects. This predominance of economic factors eases the development of forecasts because there has been a considerable body of theory as to how such forces work as well as practical experience in quantifying them. The Bureau's models of requirements for health professionals generally adjust for economic effects and population growth directly and account for other factors through trend adjustments. This has meant that forecasting models have not had to deal explicitly with poorly understood factors because the factors have been sufficiently consistent to forecast by means of an aggregate time trend.

Changes that have taken place in the delivery of health care in the late 1980s add complexities to health professions analysis and forecasting activities. It has become increasingly difficult to develop suitable analytical models to reflect these changes. Medical technology is growing exponentially, exemplified by new imaging techniques, new drugs developed from molecular biology, and new tools such as the laser. Health care is increasingly being provided in settings such as health maintenance organizations and other types of managed care group practices that were less important in the early 1980s. Methods used in the past reflecting these changes in trends are no longer suitable, but it is not entirely clear what techniques should be utilized to replace them.

Disease patterns also show potential for changes that cannot be reflected in trend analysis. AIDS has been unique as a new disease, increasing care requirements significantly, and it is quite possible that it will become the leading cause of hospitalization in many areas of the Nation. A less publicized, but potentially as important a change is the outcome of healthier lifestyles. A large proportion of our population appears to be modifying their behavior in ways that may substantially affect future disease patterns. Mortality could decline sharply among older Americans in the next decade, with corresponding increases in life expectancy, but, if this were to occur, there would be the prospect of increased prevalence of Alzheimer's Disease and other diseases of aging. In short, while past health care delivery in the past has been driven by economic forces, it is less certain that economic modeling approach will be appropriate in the future. Although development of suitable techniques for forecasting non-economic variables will be difficult, costly, and time-consuming, the Bureau of Health Professions is undertaking efforts to explore new techniques.

Next Steps

There is not a simple solution to the continuing lack of data for health professions. Of necessity, primary reliance will have to be on the capabilities of the professional and educational institutions and associations, supplemented by public/private cooperative efforts. At this time there is little prospect of new, large scale data collection for most of the health professions. Data on allied health professions, public health, and chiropractors will have to come from the associations and from the hospital sector, with occasional or partial Federal support, and the intensive use of consortia where this opportunity exists.

Forecasts of health professions requirements are becoming less certain than they were in the past. Generally, forecasts of supply of health personnel are reliable, as these estimates are largely based on accurate educational data. Some means of addressing developments underway in health care technology, disease incidence, reimbursement, and health care delivery organization will have to be developed as resources permit.

One recent activity expected to provide important health personnel information is a survey of State assessments of their health manpower shortages. In response to a Congressional mandate included in the Health Professions Reauthorization Act of 1988, as amended, the Bureau of Health Professions is contacting the chief executive officer of each State, Commonwealth, and Territory to obtain an official assessment of health manpower problems. This study will provide quantitative information on trends in health personnel in each area and identify problems of most concern. When the information is analyzed until early 1990, it should provide a diverse view of the policies and programs that may be needed to alleviate health personnel problems. Final results from the study will be included in the Eighth Report to the President and Congress on the Status of Health Personnel in the U.S.

The Bureau of Health Professions is initiating a number of other efforts to improve forecasting of health professions supply and requirements, including improvements in the data on which forecasts are based. The models for forecasting--the procedures and formulas on which the policies and programs that may be needed to alleviate health personnel problems. Final results from the study will be included in the Eighth Report to the President and Congress on the Status of Health Personnel in the U.S.

The Bureau of Health Professions is initiating a number of other efforts to improve forecasting of health professions supply and requirements, including improvements in the data on which forecasts are based. The models for forecasting--the procedures and formulas on which projections of supply and requirements are based--are being re-examined and revised to take into account recent trends in the economics and organization of health service delivery. Improvements in data are underway in conjunction with various other agencies and with non-Federal groups and associations.

The final report of the Secretary's Commission on Nursing underscored the need for improved data regarding the nursing labor market. In the spring of 1989 consequently, the Bureau of Health Professions (BHPr) contracted with the Project HOPE Center for Health affairs to provide an action plan for establishment of a longitudinal or other national database within nursing and a continuing strategy to meet critical nursing data needs. The resulting action plan is intended to provide the framework for future short- and long-term data collection efforts and to apply to non-Federal as well as Federal support. In completing the plan, the Project HOPE staff are also addressing opportunities for continuing private and public sector input for future guidance in this area.

In a related effort, data on the allied health professions which have generally been weak, is being improved through the establishment of a Strategic Allied Health Data Initiative (SAHDI) project. This activity in cooperation with the Bureau of Labor Statistics, is assisting allied health organizations in improving the comparability of data between the different allied health disciplines.

A similar initiative in public health is called the "Public Health Workforce Consortium". In its final report of the first year of operation, the Steering Committee concluded that an analytical system on the public health workforce was needed, focusing on the core of the public health and expanding on an incremental basis. They also recommend the establishment of an ongoing Consortium made-up initially of six professional associations and two Federal agencies. A framework for the new organization was established by the Steering Committee, including goals, objectives, and organizational structure. It was recommended that the American Public Health Association convene the initial consortium meeting and that the Federal Government exercise leadership in securing resources to develop and sustain the analytical system.

Other activities to improve data planned on, as resources permit, are underway for pharmacy, rural health personnel, minority dentists, personnel serving minority populations, and other important policy related topics. BHPr continues to maintain and make available to all users the Area Resource File, a county-level, computerized database of health resources including but not limited to health personnel. Area Resource File data has many applications to health resources planning and analysis.

CHAPTER VI

MEDICINE--ALLOPATHIC AND OSTEOPATHIC

This chapter presents recent developments in the supply and education of physicians, including the latest forecasts of supply of and requirements for physicians. The primary focus is to provide the most current information since publication of the previous report (DHHS, 1988c) and then place recent developments in context with historical trends.

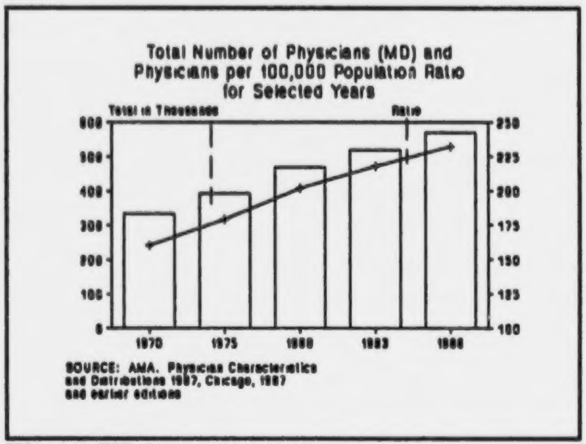
Developments in Supply

Throughout the 1980s there has been much concern about the adequacy of physician supply and specialty and geographic distribution including shortages or excesses. These concerns affect the choices of college graduates for careers in medicine and future practices of both allopathic (MD) and osteopathic (DO) physicians including their specialty choices and practice locations. The increasing number of women entering the medical field has implications for supply and distribution of physician services. The growing physician supply and its distribution also affect foreign medical graduates (FMGs), particularly in hospital-based practice, as well as recruitment and retention of minorities to meet health care demands of disadvantaged populations.

Allopathic Physician Supply

Although the supply of allopathic physicians increased between 1983 and 1986, the pace decelerated from an annual 3.5 percent increase between 1978 and 1983 to 3.1 percent in the latter 3 years (table VI-A-1). Data from the American Medical Association (AMA) showed that at the end of 1986 there were 569,160 total (including inactive) allopathic physicians. Still, growth in physician supply exceeded population growth, and the U.S. physician:population ratio continued its 2-decade rise from 228 per 100,000 in 1985 to 232 per 100,000 in 1986. The pool of active MDs has grown more slowly than the total pool, but the increase still outpaced population growth (figure VI-1).

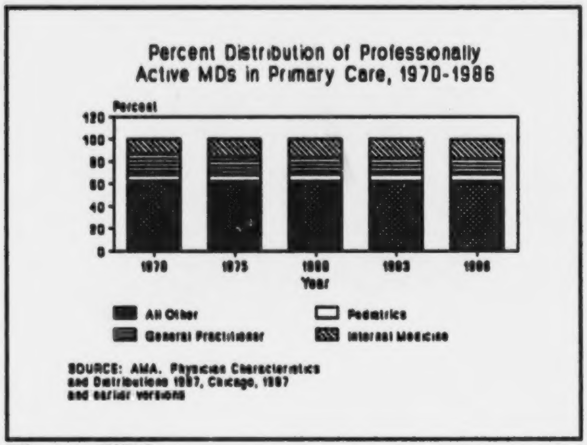
With about 50 percent of all MDs having graduated from medical schools since 1970, the age distribution of physicians remains skewed towards the under-45 age group. As the flow of new physicians stabilizes the median age will rise along with that of the general population. Changes in physician age distribution are likely to produce changes in overall activity status, specialty distribution, physician income distribution, productivity, and board certification.


Total Number of Physicians (MD) and Physicians per 100,000 Population Ratio for Selected Years

SOURCE: AMA. Physician Characteristics and Distributions 1987, Chicago, 1987 and earlier editions

Figure VI-1

The rank order of major specialties by the number of professionally active physicians in them stayed the same between 1980 and 1986: internal medicine, general/family practice, general surgery, pediatrics, psychiatry, obstetrics/gynecology, anesthesiology, orthopedic surgery, and pathology (figure VI-2). Of note is the slight decline between 1985 and 1986 in the number of practitioners of general surgery, although the surgical subspecialties continued to increase.


Percent Distribution of Professionally Active MDs in Primary Care, 1970-1986

SOURCE: AMA. Physician Characteristics and Distributions 1987, Chicago, 1987 and earlier versions

Figure VI-2

The growth in numbers of practitioners in the specialties of general/family practice, internal medicine, and pediatrics collectively kept pace with overall supply growth through 1986.[1] However, general/family practice continued its gradual long-term decline, to 13.3 percent in 1986 from 13.5 percent in 1985.

Patient care physicians accounted for approximately 80 percent of all physicians. This percentage remained relatively stable from 1975 through 1986, although it would have declined slightly if a category of "clinical fellows" had not been added in 1986 to the classification scheme. The number of physicians in research (a non-patient care category) increased between 1975 and 1985 and undoubtedly would have increased from 1985 to 1986 had not the clinical fellows category been added. The number in teaching has continued a slight decline since 1980 (table VI-A-2).

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[1] In 1981, the AMA data base began to provide estimates of internal medicine and pediatrics exclusive of their subspecialties. The share of the three specialties exclusive of subspecialties remained constant in the 1980s, at a somewhat lower percentage. For more detail see the Sixth Biennial Report (DHHS, 1988c).

Foreign Medical Graduates

In 1986 FMGs numbered 123,090 or 21.6 percent of all physicians. Data published by the AMA indicate that the percentage of FMGs involved in patient care remained approximately the same as for all physicians, and the percentage of FMGs in hospital-based practice, 14 percent, continued to be only slightly higher than the comparable percentage of total physicians, 8.2 percent.

New York, California, Illinois, Florida, and New Jersey accounted for about half of all FMGs. FMGs in residency training were also concentrated geographically, 46.6 percent of the residents in New Jersey, 33 percent in New York, 23.8 percent in Connecticut, and 23.7 percent in Illinois. Almost 35 percent of residents in Puerto Rico were FMGs (table VI-A-3). Many inner-city hospitals in New York, New Jersey, and Illinois are dependent on FMGs, especially those giving care to the indigent (AHA, 1988).

Gender and Ethnicity of Allopathic Physicians

Growth in the number of women physicians, particularly Black women physicians, outpaces that of males. Female physicians are well represented in primary care specialties, psychiatry, and pathology. Acceptance and enrollment patterns at allopathic medical schools show that the number of women physicians will continue to grow. The number of women in medical teaching has increased and currently is nearly 18 percent of all physicians with academic appointments.

Female physicians work fewer hours per week than males, 53.8 hours compared with 58.7 hours in 1988 (Marder and Thran, 1988). The extent to which child rearing affects female physician participation as opposed to other factors is not clear (Mitchell, 1984). Nevertheless, the inflow of women into the medical profession may have an increasing impact on the future supply of physicians and overall level of services.

The practicing physician pool of underrepresented minorities--Blacks, Native Americans (American Indians, Eskimos, and Aleuts), and Mexican American/mainland Puerto Rican Hispanics--continues to be relatively low when compared with their total numbers. In spite of many efforts to increase the number of minorities in medical schools, the percentage of practicing Black physicians, for instance, is currently estimated to be only 3 percent compared to the Black population, which is 12 percent. Only 3.4 percent of practicing physicians are Hispanic, although Hispanics are 6.4 percent of the population (DHHS, 1986a).

Unless there is a large increase of minority students in medical schools, the relatively slow growth of minority numbers in medicine will produce only a modest increase in the Black physician:Black population ratio through the year 2000, and, because of the rapid growth in the Hispanic population, an actual decrease in the Hispanic physician:Hispanic population ratio (DHHS, 1986a).

The Council on Graduate Medical Education (COGME), after reviewing the literature and convening public hearings, concluded that greater participation of underrepresented minorities in medicine is vitally important to increasing availability of providers and access of minority populations to health care as well as to ensure that minorities have equal access to a career in medicine (DHHS, 1988).

Although Medicare and Medicaid have substantially reduced the number of uninsured Americans and have increased access to care, about 32 million people, 15.5 percent of the Nation's civilian, noninstitutionalized population, had no private health insurance or public coverage to help pay medical needs in 1987 (Short et al, 1988). Overall, children 18 and under represent one-third of the uninsured. Higher proportions of Blacks, Hispanics, unmarried or separated adults, and persons between the ages of 19 and 24 were uninsured. Nevertheless, workers and their families still accounted for more than three-quarters of the uninsured (Short et al, 1988).

The 15.5 percent of population uninsured in 1987 is up from 12.3 percent a decade ago (Short, et al., 1988). Previous studies have shown that people who lack health insurance either some or all of the time during a year use significantly less medical care; 15 percent of uninsured families in 1982 who needed care did not receive it, compared to under 5 percent of insured families (Sulvetta and Swartz, 1986).

Even though most Americans over the past two decades reported having access to a regular source of health care, a 1986 Robert Wood Johnson Foundation survey determined that a larger proportion reported having no single source of health care than in a similar survey in 1982 (18 percent compared with 11 percent). It showed a deterioration in access to health care for the nation's poor, minorities, and uninsured. Between 1982 and 1986 the poor reported having 27 percent fewer physician visits than the nonpoor of the same health status. Minorities received less hospital care than might be appropriate for their higher rates of ill health. Blacks at all income levels reported a 33 percent lower rate of physician visits than whites. Blacks also reported less satisfaction with the care they received in both hospitalizations and ambulatory visits (Freeman et al, 1987).

Characteristics of Allopathic Practice

The rapid growth in the number of physicians continued to generate discussion about its impact on the market for physician services and characteristics of their practices. According to AMA data (AMA, 1988b) the mean number of total patient visits per week, which had been declining since 1976, appeared to have reached its lowest point in 1985 at 117.1 and then increased slightly to 119.3 visits per week in 1987. The proportion of these visits taking place in offices and nonoffice, nonhospital settings rose from 75 percent in 1982 to 79 percent in 1987, but there was a decline in the proportion of total physician visits to patients in hospitals from 25 percent of total visits per week to 21 percent. This phenomenon may reflect the decline in hospital utilization that has persisted since the early 1980s, possibly accentuated by cost constraints on inpatient care in hospitals imposed in 1983.

The trend toward non-solo practice since the early 1980s has continued, suggesting an increase of young physicians in salaried employment (AMA, 1988b). On average, salaried physicians work about the same number of weeks per year as self-employed physicians, but spend fewer hours in direct patient care. Total hours worked per week by salaried physicians in internal medicine, pediatrics, and pathology averaged slightly less than for self-employed physicians in those specialties.

Fees for office visits for established patients rose 5.7 percent from 1986 to 1987, less than both the prior year-to-year gain of 7.3 percent and the 8.4 percent annual rate posted between 1980 and 1986. Overall, however, office visit fees increased at an 8.1 percent average annual rate over the 1980 to 1987 period, substantially above the general inflation rate of 4.7 percent. Office-based physician nominal net income increased 10.7 percent from 1986 to 1987. Physicians' real net incomes increased 6.7 percent, the second successive year-to-year gain in real income since 1983 (computed in 1977 dollars) (AMA, 1988b).

The 4.5 percent increase in professional expenses between 1986 and 1987 was the lowest year-to-year increase since 1981. Offsetting reduced outlays for medical equipment and other professional expenses were increased payroll and medical insurance premiums, which accounted for 70 percent of the 1986 to 1987 increase in average total professional expenses. Liability insurance constituted 12 percent of professional expenses in 1987 compared with 7 percent in 1982. The 5.3 percent increase in office expenses, another important component of total expenses, was lower than the previous year's 8.6 percent increase and substantially under the average annual increase of 12.5 percent between 1982 and 1986.

In response to increasing concerns over growth in expenditures for physicians' services and perceived inequities by specialty and location in current payment schedules, Congress created the Physician Payment Review Commission (PPRC, 1988). The PPRC has endorsed the concept of a fee schedule based on resource costs under Medicare (PPRC, 1988; Hsiao, et al., 1988). In addition, it has recommended the use of a geographic multiplier to standardize fees for similar medical procedures and allow for geographical variations in overhead costs; improved description of procedure codes; limitations on the financial responsibilities of Medicare beneficiaries; and implementation of national expenditure targets for physician services under Part B of Medicare. The PPRC also advocated increased research on the effectiveness of procedures and strengthened review of procedure utilization. It appears that attempts will be made to rationalize and restrain the growth of physician reimbursement under Part B of Medicare. Private insurance companies can be expected to introduce similar measures (Lee et al, 1989).

Self-employed physicians continue to pay higher malpractice insurance premiums even though there has been an overall 19 percent average annual rate of decline in professional liability claims from 1985 to 1987 (Slora and Gonzalez, 1988). When adjusted for inflation, about one-sixth of the increased revenues of the average self-employed physician from 1982 to 1987 was used to pay for higher premiums. Among specialties, there is substantial variation in average premium levels. Among nine specialty groups listed, specialists in obstetrics/gynecology on average paid the highest premiums ($35,300 in 1987) while psychiatrists paid the lowest ($3,800). These variations tend to reflect differences in claims rates, although premiums are also affected by the severity of claims and other factors (Slora and Gonzalez, 1988).

In an attempt to curb the rise in malpractice claims and size of awards, 39 States strengthened or enacted new tort laws during 1986 and 1987. Although legislation varies by State, measures most often considered were limits on the doctrine of joint and several liability, noneconomic damages, punitive damages and attorney fees, as well as modification of the collateral source rule, imposition of screening panels or mandatory arbitration, special statutes of limitations, structured payments of high verdicts, and restrictions of ad damnum claims (Nolin and Witt, 1988).

Quality Assurance

Over the last fifteen years very little progress has been made in either setting standards or producing mechanisms for a systematic and comprehensive assessment of the quality of care (Caper, 1988). There is renewed interest by both private and public sector organizations in developing such mechanisms. In order to ensure delivery of quality care and the safe and effective practice of medicine, Federal government and private sector have undertaken several recent initiatives that will assess knowledge and skills of residents and practicing physicians.

In 1988 the Secretary of Health and Human Services awarded a 5-year contract to UNISYS to establish and operate the National Practitioner Data Bank (NPDB). The Bank is designed to be a repository for information on paid malpractice judgements and settlements and licensure, disciplinary actions of State medical and dental boards, adverse clinical privileging determined by health care entities, and adverse membership actions taken by professional societies.

Also, in 1988 the National Board of Medical Examiners (NBME), Federation of State Medical Boards and Educational Commission for Foreign Medical Graduates (ECFMG) sponsored the establishment of a Task Force to Study Pathways to Licensure. The Task Force has recommended adoption of a uniform examination pathway to medical licensure for all candidates. In September 1989, ECFMG will utilize Part I and Part II of the NBME examinations to assess the basic medical knowledge of graduates of medical schools located outside the U.S. who seek to enter graduate medical education in the U.S.

Finally, in 1988 the American Board of Internal Medicine and American Board of Family Practice began awarding the Certificate of Added Qualifications in recognition of competence in geriatric medicine to candidates who meet postresidency training requirements and pass an objective examination.

Managed Care

Various forms of managed care have evolved in recent years in attempts to contain increases in medical costs. One mechanism of managed care involving prepayment is the health maintenance organization (HMO). A large body of literature over the past decade has shown the HMO's capacity to contain costs by reducing hospital utilization without negatively affecting quality of services (DHHS, 1988c), although some researchers dispute the effectiveness of prepaid care (Ginsburg and Hackbarth, 1986). Studies have shown that HMOs can provide care at a cost up to 25 percent less than the fee-for-service system (Povar and Moreno, 1988), although 62 percent of respondents in a recent survey of companies offering HMO coverage stated that HMO costs were equal to or exceeded fee-for-service plans (Karr, 1988).

Enrollment in prepaid health care plans continues to grow. Between June 1985 and June 1986 enrollments in HMOs increased by 25 percent. As of June 1986, 23.7 million Americans were enrolled in 595 prepaid plans (e.g., HMOs and IPAs). Approximately two-fifths of the plans with 64 percent of the members are prepaid group practice models while the remaining three-fifths are IPA models (Rosenbach et al, 1988).

Between 1985 and 1987 the number of PPOs increased by 50 percent (from 264 to 535), and membership in PPOs increased dramatically from 1.3 million to 18.8 million. PPOs are now located in 42 States and the District of Columbia (Rosenbach et al, 1988).

Approximately one-third of all physicians participate in one or more alternative health care plans. More physicians participate in HMOs than either individual practice arrangements (IPAs) or preferred provider organizations (PPOs); 18 percent participate in HMOs, 14 percent in IPAs, and 12 percent in PPOs, respectively. The participation rate also differs by specialty. Only 18 percent of general and family practitioners participate in alternative health care plans compared with 40 percent of urologists and 39 percent of orthopedic surgeons (Rosenbach et al, 1988).

Geographic Distribution of Allopathic Physicians

The diffusion that has occurred in the past decade as a result of the increased supply can be expected to continue. However, there is considerable regional variation in physician supply. Many rural and urban areas remain unattractive for professional, economic, and lifestyle reasons (Kindig, 1989).

The number of designated primary care health manpower shortage areas (HMSAs), which may occur in urban as well as rural areas, increased from 1,836 in 1984 to 1,949 in 1986, but remained at about 1,940 during the two-year period ending December 1988. While nearly 34 million people live in the HMSAs, improvement in availability of physician manpower is indicated by the continued decline in number of physicians needed to remove the designations in these areas, from 4,525 in 1984 to 4,314 in 1986 and to 4,104 to 1988.

Recent research provides detailed insight into the geographic distribution of physicians by specialty (AMS, 1988). This analysis, using AMA county-level data on patient care physicians, investigated changes between 1975 and 1985 in numbers of physicians and ratios per 100,000 population by type of county and selected specialty group. It compared changes in county groups of total physicians and by specialty groups with comparable national physician data.

The data showed that while disparities remained in physician:population ratios between rural, low-income, and HMSA counties and the Nation as a whole, there appeared to be major differences in dispersion among specialties. For reasons described below, the rate of growth of primary care physicians in rural, low-income, and HMSA counties was below the national average, while there was a clear dispersion of nonprimary care specialists to these counties during the ten-year period. Indeed, the rate of growth in nonprimary care physicians per 100,000 population was greater in low income and HMSA counties than in the Nation as a whole. An exception was general surgery, which exhibited relatively lower rates of growth in HMSA and rural counties and did not contribute to the rate of dispersion of nonprimary care physicians.

The lower rate of growth of primary care physicians, including those in general practice, family practice, internal medicine, and pediatrics, resulted from a reduction in the number of general practice physicians between 1975 and 1985. These physicians, who are well dispersed, decreased in number from losses through retirement and death. However, limited data for 1983 and 1985 show that these losses were offset by increased numbers of family practice physicians. Rate of growth in the physician:population ratio of physicians in internal medicine and pediatrics in rural, low-income, and HMSA counties was greater than the growth rate for all physicians during that period.

Counties without physicians decreased from 162 in 1975 to 130 in 1985. Nevertheless, significant gaps still remain because substantial numbers of physicians practice in areas that already have the highest physician:population ratios. The conclusion is that increasing the number of physicians is not an efficient mechanism to redistribute services.

Historically, there has been a higher concentration of family physicians than other specialties in physician shortage counties, although the extent to which this will continue is uncertain. Of the 1988 graduating family practice residents responding to a survey, 27.6 percent reported their intention to practice in rural areas or small towns within rural areas (AAFP, 1988), compared with 33.9 percent in 1985 and 33.7 percent in 1986.

Physician:population ratios have limitations in defining maldistribution or underservice. Standards of adequacy of supply covering all types of areas and populations have not been developed, and most methods focus on primary care supply in rural areas. Further, there is no agreement on the appropriate mix of services and providers (Kindig, 1989).

Programs to Improve Access to Care

Increasing the number of physicians has improved medical service access in smaller communities, but geographic diffusion has not worked for economically deprived areas such as remote rural areas and inner-city locations. Many strategies have been tried to influence physician distribution, but it is not known which is best, although integrated strategies appear to have had some good results. Physician distribution is better understood for rural areas than for inner cities, but it is not clear that similar remedies can be applied to both areas (Kindig, 1989).

The National Health Service Corps (NHSC) was the first direct attempt by the Federal Government to alleviate the geographic maldistribution of health care providers. The 3,300 members of the NHSC, in the mid-1980s, was its peak workforce (DHHS, 1988c). In Fiscal Year 1989 half that many NHSC members will be practicing in HMSA-designated communities. Field strength is expected to decline to about 100 physicians by the mid-1990s. The predicted surplus (DHHS, 1981) and anticipated diffusion of physicians into underserved areas may have stimulated the phasing out of new NHSC scholarship awards in the 1980s, precipitating the decline (Zoler, 1988).

Although the number of physicians needed in HMSAs to remove designation as shortage areas has dropped slightly over the past eight years to about 4,100, neither the growing number of physicians nor the NHSC placement program has made an appreciable dent in the 2,000 underserved areas, even though about half of NHSC physicians remain in shortage areas after fulfilling their obligations (Zoler, 1988).

The NHSC has instituted two recruitment programs: the loan-repayment program and the scholarship obligation program. In the loan-repayment program NHSC contracts with physicians to repay educational loans in exchange for service to the most needy. In the current fiscal year 373 new NHSC physicians will be placed with about 200 additional placements next year. In addition, the NHSC amnesty program allowed reinstatement for scholarship recipients who had previously defaulted on their service commitments. For 1989, 388 health professionals decided to participate in the amnesty program; about 115 will begin service in HMSAs by the fall.

In the scholarship obligation program NHSC assigns practitioners to community and migrant health centers (C/MHCs). For a number of years this has been a significant staffing resource for these centers, delivering care in the most economically depressed areas. Howerver, cutbacks have forced clinics to recruit primary care providers to meet staffing needs.

Area Health Education Center (AHEC) programs have also been effective in encouraging physicians to select primary care specialties and, in some cases, to practice in HMSAs. Established to train providers to improve access to care for rural Americans, AHECs in partnership with C/MHCs in urban communities now train, recruit, and try to retain providers in inner cities.

There have been many successful State and private sector initiatives to encourage physicians to practice in underserved areas, although gains have been small compared to the number needed. So far no program has solved the complex problems of depressed local economies, professional isolation, lack of cultural and recreational amenities, and lack of appropriate hospital and other medical facilities as well as those of transportation, crime, and poverty. COGME concluded that geographic maldistribution "remains a serious and complex problem requiring solutions more broadly based than those focusing exclusively on medical education" (DHHS, 1988a).

The Division of Medicine of the Bureau of Health Professions (BHPr), in collaboration with the Health Care Financing Administration, is currently implementing a rural demonstration project authorized by Congress. This project expands existing primary care residencies into rural hospitals to encourage residents to practice in underserved rural areas and assists rural hospitals with staffing while providing the necessary rural experience to increase availability of primary care physicians in those areas.

Osteopathic Physician Supply

There were 26,794 doctors of osteopathic medicine in 1987, a 1-year increase of 1,316, about 6 percent. Annual rate of growth of DOs since 1977 has averaged about 5.2 percent. Of the 17,324 reporting a specialty in 1987, 54.4 percent were in general practice, a slight decrease from 57 percent a year earlier and a concomitant increase of DOs in other specialties (AOA, 1987).

The total number of DO specialty certifications continues to rise, from about 5,000 in the early 1980s to 6,566 in 1986 and 7,179 in 1987. As some hold more than one certification, the total number of certified DOs in 1987 was 5,893, up from 5,600 in 1986 (AOA, 1987).[2] Through 1987 the majority of DO certifications has consistently been in the primary care specialties, but whether the specialty distribution of the certifications reflects the actual practices of certified DOs is not known.

About 46 percent of active DOs describe their practices as office-based (21 percent of DOs were listed in the "unknown" categories). As of 1987, DOs were concentrated in 16 States (81.7 percent). Michigan continued to be the leading State, followed by Pennsylvania, Ohio, Florida, Texas, and New Jersey (figure VI-3).

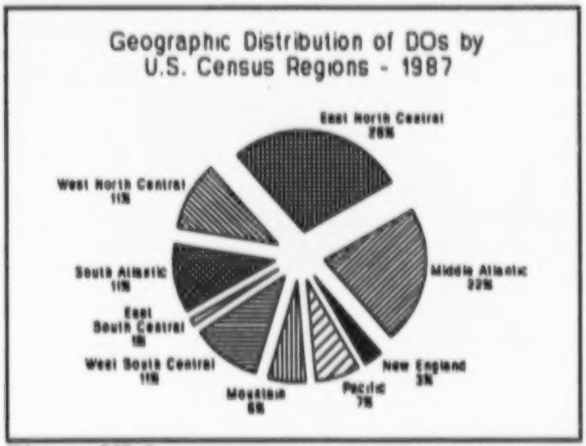

Figure VI-3

Developments in Education

This section presents the latest information on the composition of students attending medical school and participating in residency programs.

Undergraduate Allopathic Medical Education

As of July 1988, there were 127 allopathic medical schools in the U.S., 126 accredited to award the MD degree. The University of Minnesota at Duluth is accredited to offer only the first two years of the medical curriculum. The number of schools has remained the same since July 1986. Although the number of allopathic medical schools was only one fewer in 1980, 13 of them were only provisionally accredited and none had yet graduated any physicians. In the 1987-88 academic year, there were 66,798 full-time faculty members in U.S. medical schools, a number that increases by approximately 4 percent each year since 1984. It should be noted that faculty have multiple roles in teaching, patient care, research, and/or administrative activities (Jonas and Etzel, 1988).

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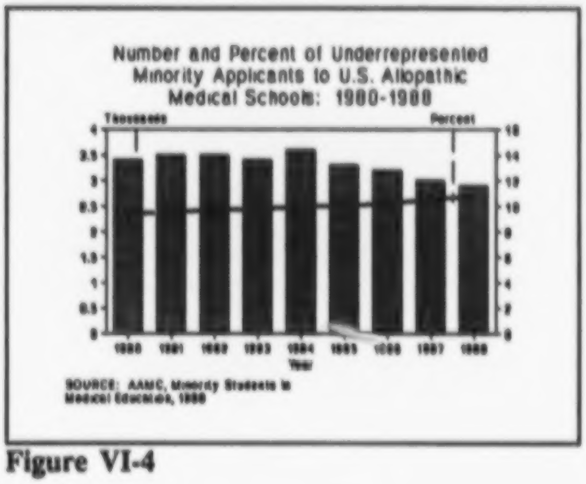
[2] The prior Biennial Reported 6,566 board certified DOs in 1986. This number represented the number of certifications held by DOs; actually, there were 5,600 individual certified DOs in 1986.

Applicants. The number of applicants to medical schools decreased each year from 1984 to 1988, declining 27.2 percent from 36,727 in 1981 (the highest number in the 1980s) to 26,721 in 1988. Because the number of female applicants declined more slowly, the women's share of all applicants has increased to an all-time high of 38.4 percent in 1988. From 1980 to 1988 the number of male applicants declined by 35.4 percent while the number of female applicants declined by only 3.6 percent (AAMC, 1989b) (table VI-A-5).

The number of minority applicants decreased from 3,578 in 1984 to 2,896 in 1988, 19 percent. However, because of the greater decline in all applicants, the percent of minority applicants gradually increased from 9.4 percent in 1980 to 10.8 percent in 1988 (AAMC, 1988a; AAMC, 1989b).

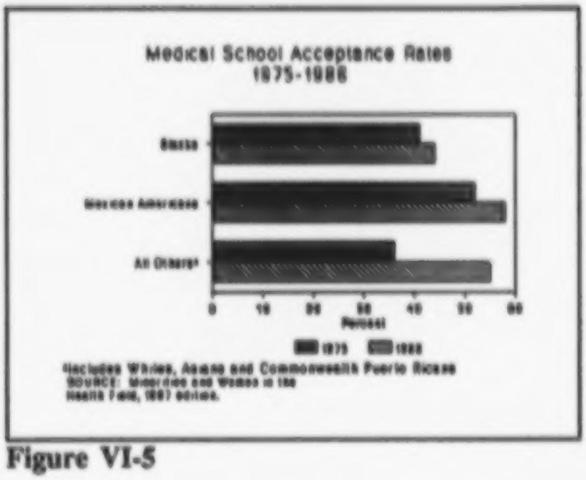


SOURCE: AAMC, Minority Students in Medical Education, 1988

Figure VI-4

As the applicant:acceptance ratio decreases, medical schools may have fewer qualified applicants from which to choose. The 1988 ratio of 1.6 was the lowest in the past 30 years (AAMC, 1989). The ratio reached a high of 2.8 from 1973 through 1975, but has declined steadily since 1984 (Jonas and Etzel, 1988; AMA, 1980) (table VI-A-6). However, early estimates of the fall 1989 applicant pool indicate a small increase in applications compared to 1988 (AAMC, 1989). Only time will tell if the change represents a trend. Although quality of the applicant pool has not declined as measured by medical college admission test scores and grade point average (AAMC, 1988b), concern has been voiced that if the ratio continues to dwindle, quality of the pool may suffer.

Acceptance. The total acceptance rate remained relatively stable throughout the early 1980s, although 1986 and 1987 brought notable increases, a pattern also true for minorities. But despite increases the minority acceptance rate has remained nearly 10 percentage points below the 61 percent for all applicants (figure VI-5). Rates for mainland Puerto Ricans



*Includes Whites, Asians and Commonwealth Puerto Ricans
SOURCE: Minorities and Women in the Health Field, 1987 edition.

Figure VI-5

and Mexican-Americans are comparable to that for all applicants, but American Indian and Black rates are lower.

Enrollment. Total enrollment in medical schools was 65,300 in the 1987-1988 school year continuing the decline that began in 1984 after the all-time high of 67,327 in 1983 (table VI-A-7). The percent age of women enrolled in medical schools has continued to rise to an all-time high of 35.2 percent. First-year enrollment gained slightly, increasing by 155 from 1987 to 1988 and reversing a downward direction that had begun in 1981. This enrollment gain can be attributed entirely to an increase in women enrollees.

Among minority groups there were no significant gains in first-year enrollment from 1987 to 1988. From 1980 to 1988 the number of Black female first-year enrollees increased 30.2 percent while the number of White male first-year enrollees decreased 13.2 percent, (AAMC, 1988a; AAMC, 1989b). Asian-American/Pacific Islanders increased by 273 (15 percent) from 1987 to 1988. This ethnic group has increased 267 percent from 1980 to 1988 (AAMC, 1988a; AAMC, 1989b) (table VI-A-8).

The number of graduates from medical schools has decreased each year since 1985, from an all-time high of 16,343 in that year to 15,830 in 1987. The percentage of female graduates continued its rise to 32.3 percent (AAMC, 1988a; AAMC, 1989b) (table VI-A-7).

The average indebtedness of medical school graduates in 1980 was $18,350 for minority graduates; for all other graduates the figure was $17,125. By 1987 the average debt for minority graduates had risen to $41,457; for all others it was $35,104. These figures are an increase of 126 percent for minority graduates and 105 percent for all other graduates (AAMC, 1988a).

An examination of the costs of obtaining a degree in medicine explains why medical school graduates incur such large debts. The median annual expenses for academic year 1987-1988 ranged from a low of $13,765 for in-State residents attending a public school to $25,629 for private school matriculants. Of the 1988 graduating class 83.1 percent reported having some amount of debt to repay, down slightly from 85 percent in 1986 (AAMC, 1989b).

A recent AMA report estimated rates of return to medical education (AMA, 1988d). These rates, comparing expected lifetime income to cost of requisite education, can be used to assess the economic advantage of incurring a debt to finance medical education. According to these data total income return to a medical education in 1985, although down slightly from 1974, appears to be sufficient across all specialties to warrant incurring substantial indebtedness at the current level of interest rates. The decline in return between 1974 to 1985 was less than for comparable occupations, although returns to various specialties vary, general/family practice and pediatrics yield negative returns while returns to general internal medicine and psychiatry are well below the level of current interest rates. Such returns can be expected to adversely influence selection of these four specialties. Impaired access to low interest loans could be an important impediment to the flow of minority students into medical practice even if financial rewards outweigh incurred debts. Minority students may amass levels of indebtedness that exceed their ability to repay.

Undergraduate Osteopathic Medical Education

The American Association of Colleges of Osteopathic Medicine Application Service (AACOMAS) processed applications from 3,030 applicants for admission to 13 of 15 colleges of osteopathic medicine for the 1988-89 academic year, the lowest number of applicants since the service began keeping records in 1976. This was a 8.9 percent decrease from 1987 (AACOM, 1988) (table VI-A-9). Nevertheless, the freshman enrollment in the 15 osteopathic medical colleges reached an all-time high of 1,772 in 1988, of which 172 (9.7 percent) were from underrepresented minority groups (figure VI-6). The number of minority freshmen increased 63.8 percent over the 1987 entering class. The bulk of gain came from Black freshmen enrollment which rose from 38 to 83 students from 1987 to 1988 (table VI-A-10).

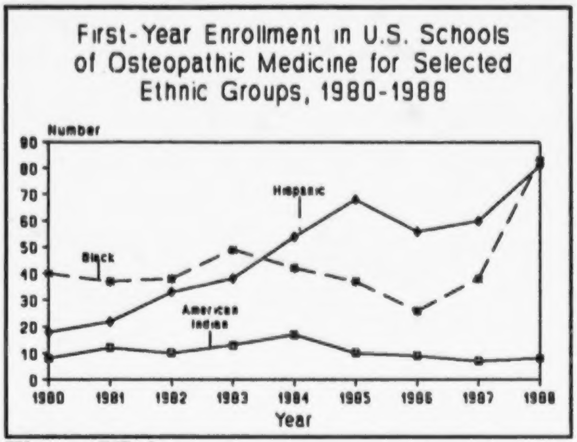

First-Year Enrollment in U.S. Schools of Osteopathic Medicine for Selected Ethnic Groups, 1980-1988

Figure VI-6

Women increased their first-year enrollment numbers to 750 in 1988. The percentage of women freshmen grew from 22.0 percent in 1980 to 32.2 percent in 1988 (AACOM, 1988; AACOM, 1989a). Total enrollment increased to 6,606 in 1988 after a slight decline in 1987 (table VI-A-9). The number of graduates from osteopathic medical colleges increased slightly to 1,572 in 1988, but was still below its all-time high of 1,587 graduates in 1986 (AACOM, 1988; AACOM, 1989a).

According to AACOM almost all osteopathic medical students graduate with high indebtedness. In 1988 average debt approached $65,000 (AACOM, 1989b), up from $60,000 a year earlier. The average debt in 1985 was $49,600 (AACOM, 1988).

Graduate Allopathic Medical Education

Factors that affect graduate medical education (GME) have important implications for the future of medical specialty practice. In 1988, special requirements were approved, and review and accreditation were begun by the Accreditation Council for Graduate Medical Education (ACGME) for subspecialty programs in child neurology, geriatrics, hand surgery, musculoskeletal oncology, orthopedic sports medicine, pediatric orthopedics, and radioisotopic pathology.

As of September 1, 1987, there were 80,996 residents on duty in 6,319 ACGME-accredited programs, a 5.4 percent increase over the 76,815 trainees on duty a year earlier. The number of residents has nearly doubled since 1970-71. But the number of U.S. medical school graduates (USMGs) has declined since 1984 and fewer have entered Graduate Year 1 (GY-1) residency training programs. The number and proportion of both Foreign National FMGs (FNFMGs) and United States Foreign Medical School Graduates (USFMGs) entering GY-1 programs began to decrease in 1982. The proportion of USFMGs in GY-1 positions decreased from 55 percent of all FMGs in 1983 to 47 percent in 1986 and to less than 46 percent in 1987. FMGs in all years of residency training, although increasing in number, have remained at 15.7 percent of all residents since last year, the lowest level since the downturn began in academic year 1972-73 when the percentage was 32.7. Female residents have continued to increase, from 19 percent in 1978 to almost 28 percent in 1987 (AMA, 1987 and 1988a).

In 1987-88 nearly 39 percent of all residents were in training in the primary care specialties of internal medicine, general/family practice, and pediatrics. If residents in obstetrics/gynecology were included, the percentage would be 45 percent. The number and percentage in primary care specialties and obstetrics/gynecology has remained relatively constant in recent years (DHHS, 1988a).

Between 1976 and 1982 the number of general/family practice programs increased from 346 to 388; growth of these programs leveled off in 1982 and then dropped to 383 in 1986 and 382 by 1987. Residents on duty in general/family practice programs dropped from 7,600 in 1984 to 7,200 in 1986, but rose to 7,300 in 1987. The number of programs for pediatrics and its subspecialties remained constant. The number of subspecialty programs in internal medicine continued to grow (AMA, 1988a).

Fifty-seven percent (10,317 of 17,991) of all 1987 residents in first postgraduate year of training were in general/family practice, pediatrics, or internal medicine, a slight percentage increase since 1982. These numbers are not predictors of future primary care physicians in the cited specialties, because many trainees in internal medicine and pediatrics, will persue subspecialty training (DHHS, 1988c).

By 1987-88 women were almost 28 percent of all residents, an increase over the 15 percent figure of the mid-1970s. Patterns of filled specialty positions show that a disproportionately high percentage of positions were filled by women in the following specialties: pediatrics (52.2 percent), child psychiatry (47.6 percent) and psychiatry (40.9 percent). Fewer were filled by women in general surgery (12.9 percent). Although the proportion in psychiatry has continued to decline, it still remains a specialty of greater preference for female than for male physicians (AMA, 1988a).

Information on the ethnic background of residents shows that, in 1987, USMG/Canadian Medical Graduate (CMG) Black residents comprised 5.2 percent of all USMG/CMG residents, up from 4.9 percent in both 1985 and 1986, but down from 5.3 percent in 1982. The pattern of specialty choice among Black residents remained generally similar to that of all residents, and the proportion of Black residents training in the four specialties of internal medicine, pediatrics, general surgery, and obstetrics/gynecology remained over 50 percent. However, the proportion of Black residents in internal medicine decreased from 24.4 percent to 21.6 percent between 1985 and 1987, from 11.1 to 9.2 percent in pediatrics, but increased from 8.2 percent to 11.5 percent in general surgery.

Osteopathic Graduate Medical Education

Nearly all osteopathic graduates take their first postgraduate year in an AOA-approved internship that is now required by the AOA. In 1987 there were 1,359 osteopathic graduates in AOA-approved internships. In addition, there were over 3,200 osteopathic physicians in osteopathic or allopathic residency training for a total of over 4,500 osteopathic physicians in graduate training.

Of residents 1,292 were in AOA-approved programs. There were also 2,025 osteopathic residents in allopathic residency programs in 1987, a marked increase from the 1985 and 1986 figures of 1,277 and 1,543 respectively. About 60 percent of osteopathic graduates in osteopathic residency training programs programs were in internal medicine (19.7 percent), general practice (18.8 percent), general surgery (13.0 percent), and obstetrics and gynecological surgery (8.4 percent) (AOA, 1987; DHHS, 1988a). Of osteopathic graduates in allopathic training programs, nearly one-half were in the specialties of family practice (27.1 percent) and internal medicine (21.5 percent) (AMA, 1988a).

Since 1981-82 the number of accredited hospitals providing osteopathic rotating internships has remained at about 150. The number of osteopathic internships increased by 36.3 percent between 1982-1983 and 1987-1988. Michigan, Pennsylvania, and Ohio continued to train the largest percentage of interns. The number of AOA-approved residency positions increased 26.3 percent, from 1,600 in 1982-1983 to 2,021 in 1987-1988. However, numbers of residents in osteopathic programs have been considerably lower than numbers of positions, increasing from 995 in 1982-1983 to 1,200 in 1984-1985, but growing more slowly to around 1,300 over the next three years.

National Resident Matching Program (NRMP)

AMA estimates of available GY-1 positions for years 1986 through 1988 have remained between 20,300 and 20,500 (AMA, 1988a). Applicants for these positions each year have included approximately 15,800 graduates of Liaison Committee on Medical Education (LCME) accredited U.S. schools, about 3,000 other US graduates (e.g., osteopathic school graduates) and (LCME) Canadian medical school graduates, about 1,600 USFMGs, and more than 4,000 FNFMGs. The number of FNFMG applicants declined by 22 percent in 1987 and a further 8 percent in 1988.

Over 90 percent of USMGs who apply for GY-1 positions through the NRMP continued to obtain them. Match rates for FNFMGs reversed their decline and rose from 24 percent in 1986 to 34 percent in 1987 and 44 percent in 1988 as FNFMGS are taking residencies in psychiatry, pediatrics, and other specialties not favored by USMGS. The USFMG match rate increased to 43 percent following a slight decline in 1986. The total number of FNFMGs matched increased to over 1,100 in 1988 after its previous six-year low of 980 in 1986. Matched USFMGs also increased slightly in number (Graettinger, 1987, 1988).

The percentage of White males and White females matched between 1984 and 1987 has remained about the same at 94 and 95 percent respectively. The match rate for Black males and Black females increased during this period from 81 to 87 percent and 83 to 90 percent respectively.

Compared with 1987, the percentage of positions in family practice filled in the 1988 match by USMGs declined from 72.2 percent to 61.9 percent. The percentage matched in internal medicine remained at about 67 percent; pediatrics declined from 68 percent to 64.5 percent; obstetrics/gynecology increased from 80.3 percent to 86 percent; and general surgery remained the same at about 73 percent (Graettinger, 1988). Match rates for the primary care specialties--family practice, internal medicine, and pediatrics--are significantly lower than for other specialties.

FMGs in Graduate Medical Education

Between 1985 and 1986, FMG residents declined both in number and percentage of all residents. In 1987 the number rose and the percentage remained the same. Of all FMGs the FNFMGs increased steadily from 1985 through 1987. The number and percentage of USFMGs dropped after 1985 when FNFMGs assumed a larger percentage of the total.

New Jersey, New York, and Puerto Rico continued to have the highest individual State percentages of FNFMGs and were the only jurisdictions in which FNFMGs exceeded 25 percent of all residents. In New Jersey nearly one of every two residents was an FMG, while in New York and Puerto Rico the ratio was approximately one out of three. Significant numbers also remained in Illinois and Connecticut.

Financing of Graduate Medical Education

COGME, in its deliberations, noted that Federal subsidies through patient care dollars for GME are being reduced and are no substitute sources are developing. The Council also noted that there is an interrelationship between medical education costs and service delivery costs. The Council also recognized that there is some debate as to whether medical education should be considered a cost of education or a cost of medical services. It further noted that GME in ambulatory settings is increasingly necessary in many specialties for optimal training and preparation for practice, yet there are difficulties in financing GME in these settings. This financing barrier is particularly problematic for primary care specialties, geriatrics, and preventive medicine and tends to produce a concentration of physicians in what may be oversupplied specialties (DHHS, 1988a).

A Look at the Future

This section presents the latest forecasts of the allopathic and osteopathic physician supply for 2000 and 2020. It provides supply estimates for U.S. medical graduates (USMGs), U.S. foreign medical graduates (USFMGs), and foreign national foreign medical graduates (FNFMGs), and for specialties and States, although all State figures are for MDs only. An explanation of changes in assumptions and methods from those in previous reports is presented. Information on methodology is found in the Sixth Report (DHHS, Sixth Report, 1988a) and elsewhere (VRI, 1985). The "basic" forecasts incorporate the most likely assumptions while "high" and "low" estimates provide a range around the basic forecast.

Premised on a continued decline in first-year enrollments between 1982 and 1987, the basic forecasting assumption is that first-year enrollments in allopathic medical schools will decline by about 3 percent between 1989 and 1992 (table VI-A-11). A "low" alternative series projects a 10 percent decline in enrollments between 1987 and 1992. The "high" alternative series assumes that first-year class sizes will increase by 5 percent between 1987 and 1992. This growth assumes a 5-year continuation of the nearly 1 percent increase in FYEs between 1987 and 1988 according to preliminary data from AAMC.

Osteopathic schools expect to graduate between 1,500 and 1,600 students during the next few years. A forecast of 1,692 first-year students per year leading to 1,560 graduates each year is adopted for the basic series of projections (table VI-A-11). The "low" alternative series assumes a one percent per year decrease in first-year class size between 1989 and 1992, similar to the decrease between 1982 and 1983. First-year enrollments would stabilize at about 1,610 in the low series. The "high" alternative series assumes that the increase in first-year class size between 1981 and 1987, about 12 percent over the 5-year period, will continue through 1992 and then stabilize at 1,900 throughout the projection period.

Current basic FMG projections are coincident with recent trends in total numbers of new FMGs added to the AMA's physician Masterfile each year. The total number of FMGs forecasted to enter the physician pool each year starts at about 5,000 in 1988 and remains at that figure throughout the entire projection period. Projections of FMGs entering practice directly through graduate medical education (GME) are derived from data on FMGs entering the first year of GME (GY-1). In the basic series of projections, the number of FMGs in accredited GY-1 GME positions in the recent past is expected to continue.

Future annual new entrant USFMGs are expected to remain at current levels based on the assumption that a similar percentage will continue to (a) pass the Foreign Medical Graduate Examination in the Medical Sciences (FMGEMS) and other (i.e., NBME) qualifying examinations, and (b) be accepted into residency training programs. Despite recent reductions in enrollments of Americans in Central American and Carribean schools as well as in USFMG participation in GME, it is assumed that teaching hospitals in the U.S. will continue to attract about 1,000 USFMGs per year as seen in the current GY-1 experience. According to NRMP data, about half of the 1,000 match to positions while the remainder seek other paths to secure positions in GME.

Table VI-1

Number of Yearly New Entrants and Losses

	New Entrants			Losses			
		FNFMGs		Deaths &	Returns		Net
Year	USFMGs	GME*	Other**	Retirements	J-visas	H-visas	Total
1988	1,146	1,258	2,685	-1,409	-720	-165	2,795
2000	1,146	1,258	2,685	-2,698	-720	-165	1,506
2020	1,146	1,258	2,685	-4,866	-720	-165	- 662

* Includes 800 J-visa temporary visitors.

** Includes those who have obtained ECFMG certification and are beneficiaries of occupational and family preferences, and H-visa recipients.

The total number of FNFMGs who enter GME is still projected to number 1,258 each year of the basic series forecast period and includes 800 exchange visitor (J-visa) FMGs, most of whom will return to their home countries as required by law. The basic forecasts assume that 10 percent either stay here permanently by obtaining waivers or return after meeting the requirement to return to their home country or country of last permanent residence for two years before becoming eligible for immigrant status. In addition, a large number of J-visa FMGs enter the country each year for participation in programs of research, consultation, and observation (about 1,300). There are no data available on how many of this latter group eventually become U.S. citizens and licensed physicians or in other ways may be counted by the AMA as active physicians.

FNFMGs other than exchange visitors are made up of those who have entered the country permanently through either routine immigration mechanisms or occupational, non- and family-preference visas and have obtained ECFMG certification. A significant number of FNFMGs enter practice directly after acquiring graduate medical education here. Another group of FNFMGs, estimated to number about 2,700 per year throughout the projection period, do not enter practice directly from GME (table VI-1). This forecast is derived from a continued greater increase in the number of FMGs on the AMA's Masterfile than are accounted for by the numbers completing GME each year. In addition, it is consistent with recent Immigration and Naturalization Service (INS) data on immigrant physicians, given an assumption that most will be entered on the AMA's Masterfile.

It is important to point out that new entrant FNFMGs have been increasing in number in recent years. In order to maintain the constant net increase each year observed in the AMA masterfile, new entrants must more than compensate for the growing pool of FMGs who exit through death and retirement. The net increase in FMG supply can not continue, however, because death and retirement losses will accelerate significantly as the current FNFMG pool ages.

Temporary visitor physicians of distinguished merit and ability (H-visa FMGs) still number about 330 new entrants each year. About one-half are assumed to remain permanently during each year of the projection period.

Summarizing the basic set of assumptions for projected numbers of FMGs

An alternative low series of estimates was made for FMGs as a function of possible constraints in availability of residency positions and implementation of policies and procedures affecting FMGs. The lower range of estimates assumes that the number of GME positions available to FNFMGs will decrease by about 7 percent per year between 1988 and 1998 to one-half of the 1988 estimate by 1998. Similarly, the number of FNFMGs entering through occupational and nonpreference immigrant categories will be reduced to one-half the present numbers by 1998. It is assumed, as for FNFMGs, that about half the current number of USFMGs will still be able to secure a training position. Therefore, in the low series, the number of USFMGs is reduced to about half their present number by 1998 and continues at that level for the balance of the projection period. A high alternative series was not estimated for FMGs.

Physician Supply Forecasts

The present basic forecasts of active physicians in 1990 is less than 1 percent higher than forecast in the previous report (DHHS, 1988c), and the forecast for 2000 is 1.8 percent higher than reported in the Sixth Report. Most of the difference is explained by larger numbers of FMGs predicted to enter practice than were projected in that report.

The supply of active physicians is projected to reach 721,600 by 2000 and nearly 850,000 by 2020. This latter figure is an increase of more than 50 percent above the 1986 supply (table VI-A-12). In the alternative estimates total supply is projected to range from 697,500 to 731,600 in 2000, a difference of about 5 percent. By 2020 the projections claim a range of 764,300 to 885,900, a 16 percent difference.

The supply of physicians is expected to expand between 1986 and 2000 at a higher rate than the population. The physician:population ratio is projected to be about 269 per 100,000 persons in 2000 (basic series), ranging from 260 to 273, up from 225 in 1986.

By 2020 physician:population ratio may begin to decline somewhat as growth in the numbers of physicians forecast from current enrollment trends and declining numbers of FMGs begin to slow in relation to population. Still, the ratio may be about 288, within a range of 260 to 301.

Projected numbers of U.S. and Canadian-trained physicians in the basic series still account for about 73 percent of the growth in the overall supply between 1986 and 2000, with growth in foreign-trained physicians making up 17 percent of the total and increases in osteopathic physicians accounting for the remaining 10 percent. By 2020 U.S. and Canadian-trained MDs will account for about 78 percent of growth in overall supply while FMGs will account for 10 percent; the remaining 12 percent will be contributed by DOs.

Net increases in number of FMGs are expected to average about 2,200 per year between 1986 and 2000 and the total number of FMGs in U.S. practice is expected to be about 125,900 by 1990 and reach 130,800 (low series) to 146,600 (basic series) by 2000. For reasons explained above, the year 2020 may see no further net increases in FMGs from the 2000 level.

Women accounted for about 15 percent of all physicians in 1986. However, the recent major increases in first-year enrollments of women in schools of allopathic and osteopathic medicine have resulted in substantial growth in their numbers and proportion of all physicians. Women are expected to make up about 17 percent of the 1990 physician supply and by 2000 are expected to comprise 23 percent and exceed 160,000 in number (table VI-A-13). By 2020 women will constitute about 30 percent of active physicians and number about 250,000.

A difference of only 5 percent between alternative estimates for 2000 demonstrates the relative insensitivity of total supply in the shorter term to even sharp changes in future U.S. medical school enrollments. Much of the future supply of physicians is already either in place or in training. The base of active physicians is now sufficiently large that, even if enrollments were to decline by as much as 20 percent over the next 11 years, total supply in 2000 would fall by less than 6 percent. The overall rate of growth in physician supply is, in fact, declining over the entire forecast period by about 374 fewer physicians in each year's increase. By 2020, if present trends continue, growth in supply of physicians will level off and perhaps even decline as numbers of new entrants become insufficient to offset losses from deaths and retirements. If the forecasts were carried further out, by about 2025 there would be fewer physicians forecast than in the previous year.

Between 1986 and 2000 the numbers of physicians are still projected to increase in nearly all specialties (table VI-A-14). The largest increases are projected for "other medical specialties"--63 percent by 2000 and 91 percent by 2020. Smallest overall increase is projected for surgical specialties--23 percent between 1986 and 2000 and 36 percent by 2020.

Primary care physicians--those in family medicine and general internal medicine, and general pediatrics (exclusive of their subspecialties)--are projected to increase 23 percent between 1986 and 2000 and 44 percent by 2020. While their collective growth in the last five years (dominated by growth in internal medicine and pediatrics), has kept pace with overall supply growth, primary care is expected to grow at a somewhat slower rate in future years.

Projections of physicians supply by Regions shows that the Western Region is still expected to grow the most--12 percent by 1990, and triple that amount by 2000. Smallest change is anticipated in the Midwest Region; supply is expected to grow 7 percent by 1990 and 22 percent from 1986 to 2000 (table VI-A-15).

Smallest overall growth among States is expected in North Dakota where supply is projected to increase 15 percent between 1986 and 1990 and 22 percent by 2000. The greatest increase is expected in Alaska, which currently has relatively few physicians, at a rate of about 34 percent between 1986 and 1990 and 121 percent between 1986 and 2000 (table VI-A-15).

In contrast to supply, the greatest predicted gain in the physician:population ratio is for the Northeast--38 percent between 1986 and 2000. Even though the Northeastern States are expected to have small increases in numbers of MDs, their populations are expected to grow at an even slower rate, producing the higher than average ratio (table VI-A-16).

The Western Region is predicted to have a large increase in population and, thereby, a relatively small gain in physician:population ratio--just 3 percent between 1986 and 1990 and 7.5 percent by 2000. The largest and smallest State-level ratio changes are expected in the District of Columbia (117 percent by 2000), and Arizona (-20 percent), between 1986 and 2000 respectively.

Physician Requirements Forecasts

The BHPr requirements projection model attempts to estimate the number of physicians required in future years based upon a continuation of the current and recent patterns of health services. It considers changes likely to occur in the size and composition of the population, the price that consumers pay for health services including amount and type of health insurance coverage, and adjustments for certain major departures from current patterns of utilization such as growth in managed care plans. These forecasts have appeared in previous biennial reports (DHHS, 1986b; DHHS, 1988c), and have been referenced by COGME in its mandate to assess the adequacy of physician supply (DHHS, 1988a). A detailed discussion of the method of forecasting is presented elsewhere (DHHS, 1982).

The BHPr model, programmed with the most recent published data, has been used to derive the forecasts presented here. These forecasts take into account recent changes in utilization patterns in office, outpatient, and inpatient settings, and in physician behavior. Most significantly, they are BHPr's first attempt at separating requirements for primary and nonprimary care physicians.

Latest data from the American Hospital Association (AHA, 1988) and the National Ambulatory Medical Care Survey (DHHS, 1988b) reveal that the rapid decline in hospital admissions and hospital average daily census in the 1980s, presumably byproducts of the prospective payment system, coincided with a rapid increase in office visits to nonprimary care physicians and increases in outpatient visits in hospitals. Previous forecasts were unable to incorporate the impact of these declines in hospital utilization. These data also demonstrate that declining primary care physician per capita utilization of the late 1970s appears to have abated in the 1980s.

With the 1970s experience weighted somewhat less than more recent experience and not predicated entirely on the few data points available in the 1980s, the forecast yielded a trend that displayed a relatively constant per capita rate of growth that was used to forecast requirements estimates. Thus, these forecasts not only take into account latest estimates of future U.S. population subgroups based on gender and age, but also account for recent trends in per capita utilization.

In addition, these forecasts account for differential allocations of time to clinical and nonclinical practice (i.e., productivity) by specialty. Physicians' ability to accommodate demand for office visits is a function of allocation of time to those visits.

The requirements forecasts to the year 2000 are based on the following assumptions:

- *Per capita utilization of outpatient departments will increase steadily and contribute to growth in utilization of both primary and nonprimary care physicians who staff those clinics.*
- *Primary care office visits per capita will grow about 3 percent by 2000, buoyed by growth in managed care systems that are largely staffed by primary care physicians. Future changes in primary care physician utilization will be driven mainly by changes in demographics of the population.*
- *Per capita utilization of inpatient services measured by average daily hospital census has reached its lowest point and will remain constant over the projection period reflecting the continued effect of cost containment strategies on admissions and on length of stay. Thus, its*

contribution to growth in nonprimary care physician utilization will also remain constant. Office-based nonprimary care per capita utilization will parallel the growth of the period preceding the 1980s. It is assumed that the rate of increase in per capita nonprimary care office-based visits will continue expanding by about 20 percent between 1986 and 2000.

- *Overall per capita office visits will increase over the projection period, but the primary/nonprimary care composition will change from one dominated by primary care today to one dominated by nonprimary care in the future.*

As overall population growth slows, there will be more elderly people in the age distribution, with a concomitant increase in demand for services. The BHPr requirements model projects requirements for 209,550 and 376,040 for primary and nonprimary care physicians respectively in 1990 and 233,620 and 437,740 for primary and nonprimary care physicians respectively in 2000 (table VI-A-17).

Aggregate requirements estimates, higher than those reported in prior biennial reports, are caused by changes in utilization patterns and physician productivity coupled with a stronger than expected demand for services.

Future Adequacy of Physician Supply

The BHPr requirements estimates for physicians in 2000 are less than its supply projections (table VI-A-17). However, it should be emphasized that supply/requirements comparisons in the assessment of supply adequacy should be interpreted cautiously before being considered as justification for private or public policy changes. Reasonable alternative assumptions can produce markedly different conclusions about adequacy of supply. Most importantly, the expectation that the number of physicians available should be equal to the number of physicians needed should be reassessed. One researcher, for example, convincingly argues that an excess of physicians of a certain number is far less costly than a shortage of the same number (Harris, 1986), although other researchers argue that more physicians mean an inefficient and costly health care system (Ginsberg, 1988).

The AMA recently reported its first projections of the utilization of physician services by specialty, which it compared with its specialty-specific projections of physician supply. Employing methods and assumptions similar to the BHPr, the AMA concluded that between 1985 and 2000 projected growth in supply should exceed projected growth in utilization by about 10 percent (AMA, 1988d). However, the differential rate of growth between supply and utilization is projected to vary considerably among specialties. Physician supply is projected to grow much faster than utilization of services in pediatrics, obstetrics/gynecology, emergency medicine, and medical subspecialties while utilization is projected to grow faster than supply in general surgery.

Rather than concluding that results of differences in growth of supply and utilization lead to shortages or surpluses, the AMA report cited six factors that should be considered before concluding that public or private intervention is necessary to respond to these numerical differences. It pointed to the possibility that the health care system would make adjustments to eliminate some of the differences such as inculcating price-driven adjustments and a potential for changing lifestyles of young physicians. It also delineated factors that might change in the future such as medical technologies, new forms of organization, geographic variations in medical practice, and incidence and prevalence of disease.

Others charged with examining the adequacy of physician supply have reached similar conclusions. COGME has recently concluded that there is now or soon will be an oversupply of physicians (DHHS, 1988a), but that the oversupply is an aggregate of undersupplies in general internal medicine and family practice, an adequate supply in pediatrics, and oversupplies in some of the nonprimary care specialties. Yet it noted significant uncertainties that could change its assessment and felt that because of the many factors affecting both supply of and demand for physician services, it was unable either to measure the extent of oversupply or to predict how far into the future it will persist.

The Council further concluded that there is conflicting evidence whether an oversupply of physicians would necessarily lead to socially undesirable consequences. It cited positive benefits including increased availability of physician services, improved quality of care due to additional time available per patient, and greater physician attention to health promotion and disease prevention activities, teaching, and community service. Undesirable consequences cited included poorer quality of care due to fewer opportunities for maintaining skill levels, added patient risks resulting from any tendency to perform "unnecessary" procedures, and increased expenditures for health care.

In the specialty area, the Council concluded that even though there is an adequate supply of physicians in pediatrics, there will be an oversupply of pediatricians in the years ahead given current health care policy regarding insurance coverage for children. This conclusion appears consistent with the utilization-based results of the AMA. If, however, coverage is extended to the substantial numbers of children who now lack it, COGME concluded that the surplus of pediatricians would rapidly be eliminated.

Indeed, scenario modeling conducted by BHPr on its set of utilization-based requirements indicated sensitivity to various assumptions. For example, introducing the goal-oriented scenario of universal coverage for the 11 million children currently uninsured produced a sufficient increase in office-based primary care per capita utilization for children under 14 years of age to require an additional requirement for 2,000 to 6,000 office-based primary care physicians by 1995 (the year assumed as that of implementation), continuing to the year 2000. While this adjustment in level of utilization is equivalent to at least 10 percent of primary care supply/requirements difference in the year 2000, nevertheless, it could be concluded that the primary care supply/requirements balance forecasted for 1995 could "absorb" such a goal-oriented policy recommendation without producing dramatic changes in current patterns of care delivery. However, a goal-oriented scenario to insure the remaining 25 million uninsured adults would drive per capita utilization to new heights and probably result in overall utilization fully absorbing the difference in primary care supply/requirements.

Under yet another alternative scenario, the relatively small increase in per capita utilization of primary care services assumed in the Bureau's model could be further adjusted by incorporating a larger rate of utilization by assuming that the impact of growing ambulatory-based technology would permit efficacious early detection, diagnosis, and prevention of disabling chronic conditions that dominate the current morbidity profile (Goldsmith, 1988). This scenario would further increase requirements for primary care physicians, shifting even more the primary care supply/requirements relationship.

Adding to the uncertainties of physician supply adequacy has been publication of recent articles that argue that there will be little or no physician surplus between now and the year 2000. In one study the authors present a new framework for estimating the future balance between supply and utilization of physician services (Schwartz, et al, 1988). They conclude that even if competitive medical plans, usually requiring fewer physician personnel, serve approximately half the population by the year 2000, there will probably be little or no surplus of physicians in patient care. The study's premises and conclusions bring into sharper focus the dependency of estimates of supply and requirements on underlying assumptions and plausible changes in health care consumption and delivery. The study, for example, assumes a stronger increase in demand for physician services than assumed by other researchers. It also projects a greater increase in number of physicians in nonpatient care activities such as teaching, research, and administration.

For the last two years, a Task Force on Physician Supply created by the AAMC has been examining issues related to number and utilization of physicians in this country. The Task Force has nearly completed its deliberations; its draft report (final to be released later in 1989) concludes that, because of the uncertainty of future demand for medical services and characteristics of medical practice, there will not necessarily be a "surplus" of physicians, although it is likely that there will be an "abundance." The report also states that this abundance of physicians removes an excuse for leaving signficiant numbers of our citizens without adequate medical services (AAMC, 1989b).

It is clear that further collection of data and analytic work in this area is warranted. In the public sector BHPr will continue its activities to refine its methods and update its data bases to reflect any changes in care consumption, delivery, or physician supply outputs.

Further, in its staff capacity to COGME, it plans to supplement the existing utilization-based requirements estimates by employing a needs-based approach initially for six specialties including family medicine, general internal medicine, general pediatrics, general surgery, obstetrics/gynecology, and psychiatry.

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Table VI-A-1. THE SUPPLY OF PHYSICIANS (MDs) IN THE U.S.: SELECTED YEARS, 1963-1986

	Aggregate Supply as of December 31				
	1963	1973	1978	1983	1986
Total Physicians	276,475 1/	366,379	437,486	519,546	569,160
U.S. Graduates	238,571	288,719	339,114	399,678	437,922
Foreign Graduates	36,569	77,660	98,372	119,868	131,238
Canadian	5,644	6,325	7,021	7,863	8,148
Other	30,925	71,335	91,351	112,005	123,090
Percent FMGs	13.2	21.2	22.5	23.1	23.1
Physicians per 100,000 Population					
Total	146	174	196	218	232
USMGs	126	137	152	168	178
FMGs	19	37	44	50	54
Total U.S. Population (in thousands)	189,242	210,908	223,400	238,189	245,163

	Average Annual Increases and Percent Changes							
	1963-1973		1973-1978		1978-1983		1983-1986	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total Physicians	8,990	2.9	14,221	3.6	16,412	3.5	16,538	3.1
U.S. Graduates	5,015	1.9	10,079	3.3	12,113	3.3	12,748	3.1
Foreign Graduates	4,109	7.8	4,142	4.8	4,299	4.0	3,790	3.1
Canadian	68	1.1	139	2.1	168	2.3	95	1.2
Other	4,041	8.7	4,003	5.1	4,131	4.2	3,695	3.2
Total U.S. Population (in thousands)	2,167	1.1	2,498	1.2	2,958	1.3	2,325	1.0

1/ Includes 1,335 physicians, addresses unknown, who are not distributed according to sources of medical education.

SOURCES: American Medical Association. Distribution of Physicians in the U.S., 1973. Chicago, 1974.
American Medical Association. Physician Distribution and Medical Licensure in the U.S., 1978. Chicago, 1979.
American Medical Association. Data Sheet on Physicians, and Physician Characteristics and Distribution, 1981. Excerpts from the AMA Physician Masterfile. Chicago, January, 1983.
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Table VI-A-2. MAJOR PROFESSIONAL ACTIVITY OF FEDERAL AND NONFEDERAL PHYSICIANS (MDs): SELECTED YEARS, 1970-1986

Percent Change

Activity	1970	1975	1980	1983	1986	(Annual Rate) 1970-1983	(Annual Rate) 1983-1986	
Total Physicians	334,028	393,742	467,679	519,546	569,160	3.5	3.1	
Patient Care	278,535	311,937	376,512	423,361	462,126	3.3	3.0	(2.2+)
Office-Based	192,439	215,429	272.000	309,891	326,978	3.7	1.8	
Hospital-Based	86,096	96,508	104,512	113,470	135,148	2.1	6.0	
Residents	51,228	57,802	62,042	73,171	77,979	2.8	2.1	
Staff	34,868	38,706	42,470	40,299	46,408	1.1	4.8	
Clinical Fellows					10,761			
Nonpatient Care	32,310	28,343	38,404	43,436	43,624	2.3	0.1	(7.8+)
Medical Teaching	5,588	6,445	7,942	7,783	7,721	2.6	-0.2	
Administration	12,158	11,161	12,209	13,828	13,399	1.0	2.4	
Research	11,929	7,944	15,377	18,535	17,847	3.4	-1.3	
Other	2,635	2,793	2,876	3,290	3,657	1.7	3.6	
(Research including Clinical Fellows)	11,929	7,944	15,377	18,535	28,608	3.4	15.6	
Not Classified or Address Unknown	3,562	32,013	27,019	15,838	16,575	12.2	1.5	
Inactive	19,621	21,449	25,744	36,911	46,835	5.0	8.3	

Percent Distribution

Activity	1970	1975	1980	1983	1986	(1986+)
Total Physicians	100.0	100.0	100.0	100.0	100.0	(100.0)
Patient Care	83.4	79.2	80.5	81.5	81.2	(79.3)
Office-Based	57.6	54.7	58.2	59.7	57.4	
Hospital-Based	25.8	24.5	22.3	21.8	23.7	
Residents	15.3	14.7	13.3	14.1	13.7	
Staff	10.4	9.8	9.1	7.7	8.2	
Clinical Fellows					1.9	
Nonpatient Care	9.7	7.2	8.2	8.4	7.7	(9.6)
Medical Teaching	1.7	1.6	1.7	1.5	1.4	
Administration	3.6	2.8	2.6	2.7	2.5	
Research	3.6	2.0	3.3	3.6	3.1	
Other	0.8	0.7	0.6	0.6	0.6	
Not Classified or Address Unknown	1.1	8.1	5.8	3.0	2.9	
Inactive	5.9	5.4	5.5	7.1	8.2	

SOURCES: American Medical Association. Physician Distribution and Medical Licensure in the U.S., 1968-1982 editions, Chicago; American Medical Association. Physician Characteristics and Distribution in the U.S., 1987 and prior editions, Chicago. Data as of December 31.

+ Adjustment for shift of Clinical Fellows for comparison with prior years.
Note: Clinical Fellows category was added in 1986; prior years included in the Research Category.

Table VI-A-3. NUMBER OF FMGs IN RESIDENCY AND PERCENT FMGs IN TOP ELEVEN RANKED STATES, SEPTEMBER 1, 1987 (RANKED BY PERCENT OF FMGs)

State	Residents	Number of FMGs	Percent FMGs	Rank
New Jersey	2,148	1,002	46.6	1
Puerto Rico	869	302	34.8	2
New York	11,968	3,950	33.0	3
Connecticut	1,501	357	23.8	4
Illinois	4,306	1,020	23.7	5
North Dakota	104	23	22.1	6
Michigan	3,376	666	19.7	7
Delaware	184	35	19.0	8
Maryland	2,004	347	17.3	9
Rhode Island	456	71	15.5	10
Florida	2,056	311	15.1	11

SOURCE: American Medical Association. 1988-89 Directory of Graduate Medical Education Programs. Chicago, 1988.

Table VI-A-4. NUMBER OF NONFEDERAL PHYSICIANS AND PHYSICIANS PER 100,000 CIVILIAN POPULATION, BY STATES 1/

	1986 Civilian Population		1986 Total Nonfederal		Nonfederal Physicians per 100,000 Civilian Population							1986 Rank by Physician-to-Population Ratio	
	(in 000s)	Percent	Physicians	Percent	1980	1980-1983 Percent Change	1983	1983-1986 Percent Change	1986	1980-1986 Percent Change	Patient Care 1986	Total	Patient Care
						(Changes In Annual Rates)							
Total U.S.	239,357	100.0	538,008 2/	100.0	195	2.8	212	2.0	225	2.4	184	--	--
State													
Alabama	4,028	1.7	6,323	1.2	130	3.2	143	3.2	157	3.2	135	43	43
Alaska	509	0.2	724	0.1	134	0.0	132	2.5	142	1.0	127	48	47
Arizona	3,292	1.4	7,303	1.4	205	2.1	218	0.6	222	1.3	171	15	20
Arkansas	2,362	1.0	3,664	0.7	128	3.8	143	2.7	155	3.2	132	44	44
California	26,675	11.1	71,349	13.3	248	1.8	262	0.6	267	1.2	214	7	6
Colorado	3,223	1.3	7,028	1.3	210	0.6	214	0.6	218	0.6	178	18	17
Connecticut	3,173	1.3	9,833	1.8	264	2.9	288	2.5	310	2.7	249	5	5
Delaware	628	0.3	1,290	0.2	169	4.7	194	1.9	205	3.3	172	21	19
Dist. of Col.	619	0.3	3,819	0.7	576	1.4	600	0.9	617	1.2	467	1	1
Florida	11,572	4.8	27,851	5.2	208	2.8	226	2.2	241	2.5	182	11	15
Georgia	6,032	2.5	10,524	2.0	149	3.0	163	2.2	174	2.6	150	36	32
Hawaii	1,004	0.4	2,506	0.5	222	1.5	232	2.5	250	2.0	203	9	10
Idaho	996	0.4	1,341	0.2	116	2.5	125	2.6	135	2.6	114	50	51
Illinois	11,512	4.8	25,537	4.4	191	3.2	210	1.9	222	2.5	185	16	13
Indiana	5,496	2.3	8,731	1.6	135	2.9	147	2.6	159	2.8	135	42	42
Iowa	2,850	1.2	4,384	0.8	132	3.2	145	2.0	154	2.6	128	45	46
Kansas	2,435	1.0	4,460	0.8	166	2.0	176	1.3	183	1.6	153	32	31
Kentucky	3,695	1.5	6,188	1.2	139	3.7	155	2.5	167	3.1	144	39	39
Louisiana	4,472	1.9	8,453	1.6	161	3.0	176	2.4	189	2.7	164	29	25
Maine	1,164	0.5	2,306	0.4	169	2.9	184	2.5	198	2.7	157	23	29
Maryland	4,411	1.8	15,000	2.8	281	3.7	313	2.8	340	3.2	259	2	4
Massachusetts	5,819	2.4	19,766	3.7	285	3.4	315	2.6	340	3.0	264	3	2
Michigan	9,134	3.8	17,549	3.3	166	3.1	182	1.8	192	2.5	160	27	27
Minnesota	4,212	1.8	9,535	1.8	200	2.8	217	1.4	226	2.1	188	14	12
Mississippi	2,603	1.1	3,416	0.6	112	2.9	122	2.4	131	2.6	115	51	50
Missouri	5,050	2.1	9,996	1.9	170	2.9	185	2.3	198	2.6	166	24	24
Montana	815	0.3	1,323	0.2	140	2.3	150	2.6	162	2.5	137	41	41
Nebraska	1,585	0.7	2,762	0.5	157	1.7	165	1.8	174	1.7	149	37	35
Nevada	953	0.4	1,676	0.3	147	4.3	167	1.8	176	3.0	146	35	38
New Hampshire	1,021	0.4	2,149	0.4	180	3.4	19	1.8	210	2.6	168	20	22
New Jersey	7,597	3.2	18,883	3.5	201	4.3	228	3.0	249	3.3	204	10	9
New Mexico	1,462	0.6	2,735	0.5	166	2.0	176	2.0	187	2.0	149	31	36
New York	17,746	7.4	57,779	10.7	280	3.2	308	1.9	326	2.6	261	4	3
N. Carolina	6,227	2.6	11,783	2.2	162	2.6	175	2.6	189	2.6	155	28	30
North Dakota	668	0.3	1,136	0.2	143	3.2	157	2.7	170	2.9	148	38	37
Ohio	10,738	4.5	21,744	4.0	170	3.6	189	2.2	202	2.9	170	22	21
Oklahoma	3,272	1.4	4,994	0.9	134	2.2	143	2.3	153	2.2	131	46	45
Oregon	2,696	1.1	5,877	1.1	194	2.2	207	1.7	218	2.0	177	19	18
Pennsylvania	11,877	5.0	28,476	5.3	197	4.1	222	2.6	240	3.3	197	12	11
Rhode Island	968	0.4	2,489	0.5	223	1.6	234	3.2	257	2.4	210	8	7
South Carolina	3,312	1.8	5,522	1.0	143	2.1	152	3.2	167	2.6	141	40	40
South Dakota	702	0.3	1,004	0.2	118	4.3	134	2.2	143	3.3	121	47	48
Tennessee	4,783	2.0	9,285	1.7	163	3.0	178	2.9	194	2.9	167	25	23
Texas	16,541	6.9	29,207	5.4	159	1.6	168	1.8	177	1.8	149	33	33
Utah	1,659	0.7	3,128	0.6	170	1.5	178	2.0	189	1.8	158	30	28
Vermont	541	0.2	1,469	0.3	231	2.4	248	3.1	272	2.8	209	6	8
Virginia	5,617	2.3	12,311	2.3	186	2.6	201	2.9	219	2.8	183	17	14
Washington	4,406	1.8	10,079	1.9	193	3.0	211	3.8	229	2.9	180	13	16
West Virginia	1,918	0.8	3,381	0.6	141	4.3	276	3.2	176	3.8	149	34	34
Wisconsin	4,783	2.0	9,234	1.7	166	3.6	182	2.0	193	2.5	163	26	26
Wyoming	503	0.2	706	0.1	120	4.0	135	1.2	140	2.6	119	49	49

1/ Columns may not add to total because of rounding.

2/ Excludes 6,300 nonfederal MDs in the possessions.

SOURCE: American Medical Association. Physician Characteristics and Distribution in the U.S., 1987 edition. Chicago, 1987.

Table VI-A-5. APPLICANTS TO U.S. MEDICAL SCHOOLS, BY GENDER: SELECTED ENTERING YEARS 1968-1988

ENTERING YEAR	APPLICANTS TOTAL NUMBER	NUMBER OF MEN	PERCENT MEN	NUMBER OF WOMEN	PERCENT WOMEN
1968	21,118	19,021	90.1	2,097	9.9
1978	36,636	27,075	73.9	9,561	26.1
1980	36,100	25,456	70.5	10,644	29.5
1981	36,727	25,054	68.2	11,673	31.8
1982	35,730	24,045	67.3	11,685	32.7
1983	35,200	23,239	66.0	11,961	34.0
1984	35,944	23,468	65.3	12,476	34.7
1985	32,893	21,331	64.8	11,562	35.2
1986	31,323	20,056	64.0	11,267	36.0
1987	28,123	17,712	63.0	10,411	37.0
1988	26,721	16,457	61.6	10,264	38.4

SOURCE: AAMC, Minority Students in Medical Education: Facts and Figures IV, Washington, DC, 1988.
Data for 1988 were obtained through personal communication with AAMC staff.

Table VI-A-6. NUMBER AND PERCENT OF ACCEPTED APPLICANTS TO U.S. MEDICAL SCHOOLS AND APPLICANT ACCEPTANCE RATIO, BY GENDER: SELECTED ENTERING YEARS 1968-1988

ENTERING YEAR	ACCEPTED APPLICANTS TOTAL	PERCENT TOTAL	NUMBER OF MEN	PERCENT MEN	NUMBER OF WOMEN	PERCENT WOMEN	APPLICANT ACCEPTANCE RATIO TOTAL	MEN	WOMEN
1968	10,092	47.8	N/A	N/A	N/A	N/A	2.1	N/A	N/A
1978	16,527	45.1	12,352	45.6	4,175	43.7	2.2	2.2	2.3
1980	17,146	47.5	12,196	47.9	4,950	46.5	2.1	2.1	2.2
1981	17,286	47.1	11,953	47.7	5,333	45.7	2.1	2.1	2.2
1982	17,294	48.4	11,843	49.3	5,451	46.6	2.1	2.0	2.1
1983	17,209	48.9	11,577	49.8	5,632	47.1	2.0	2.0	2.1
1984	17,194	47.8	11,463	48.8	5,731	45.9	2.1	2.0	2.2
1985	17,228	52.4	11,370	53.3	5,858	50.7	1.9	1.9	2.0
1986	17,092	54.6	11,159	55.6	5,933	52.7	1.8	1.8	1.9
1987	17,027	60.5	10,822	61.1	6,205	59.6	1.7	1.6	1.7
1988	17,108	64.0	10,785	65.5	6,323	61.6	1.6	1.5	1.6

SOURCE: AAMC, Minority Students in Medical Education: Facts and Figures IV, Washington, DC, 1988. Data for 1988 were obtained through personal communication with AAMC staff.

N/A= Not available

Table VI-A-7. FIRST-YEAR ENROLLMENT, TOTAL ENROLLMENT, AND GRADUATES OF U.S. MEDICAL SCHOOLS, BY GENDER: SELECTED YEARS 1968-1988

	FIRST-YEAR ENROLLMENT			TOTAL ENROLLMENT			GRADUATES		
ENTERING YEAR	TOTAL NUMBER	NUMBER OF WOMEN	PERCENT WOMEN	TOTAL NUMBER	NUMBER OF WOMEN	PERCENT WOMEN	TOTAL NUMBER	NUMBER OF WOMEN	PERCENT WOMEN
1968	9,863	887	9.0	35,833	3,136	8.8	8,059	607	7.5
1978	16,501	4,173	25.3	62,213	15,102	24.3	14,391	3,445	23.9
1980	17,186	4,966	28.9	65,189*	17,248	26.5	15,135	3,526	23.3
1981	17,268	5,317	30.8	66,298	18,505	27.9	15,673	3,902	24.9
1982	17,254	5,462	31.7	66,748	19,597	29.4	15,985	4,007	25.1
1983	17,150	5,653	33.0	67,327	20,635	30.6	15,802	4,232	26.8
1984	16,997	5,715	33.6	67,016	21,316	31.8	16,343	4,632	28.3
1985	16,963	5,800	34.2	66,585	21,650	32.5	16,318	4,904	30.1
1986	16,819	5,894	35.0	66,125	22,100	33.4	16,117	4,957	30.8
1987	16,713	6,098	36.5	65,735	22,544	34.3	15,830	5,107	32.3
1988	16,868	6,254	37.1	65,300	22,985	35.2	N/A	N/A	N/A

SOURCE: AAMC, Minority Students in Medical Education: Facts and Figures IV, Washington, DC, 1988. Data for 1988 were obtained through personal communication with AAMC staff.

* Includes 55 gender not available.

Table VI-A-6. FIRST-YEAR ENROLLMENT* IN U.S. MEDICAL SCHOOLS, BY ETHNIC GROUP: SELECTED ENTERING YEARS 1980-1988

Entering Year

	1980		1982		1984		1986		1987		1988	
Ethnic Group	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
White	14,262	83.0	14,085	81.6	13,606	80.0	12,987	77.2	12,511	74.9	12,386	73.4
Black American	1,128	6.6	1,145	6.6	1,148	6.8	1,174	7.0	1,221	7.3	1,210	7.2
Mexican-American	258	1.5	305	1.8	329	1.9	331	2.0	308	1.8	296	1.7
Puerto Rican (mainland)	95	0.6	114	0.7	118	0.7	111	0.7	116	0.7	127	0.8
Puerto Rican (Commonwealth)	241	1.4	229	1.3	236	1.4	236	1.4	220	1.3	239	1.4
Other Hispanic	224	1.3	278	1.6	243	1.4	276	1.6	283	1.7	288	1.7
American Indian/ Alaskan Native	67	0.4	62	0.4	77	0.5	61	0.4	68	0.4	76	0.5
Asian American/ Pacific Islander	572	3.3	936	5.4	1,124	6.6	1,514	9.0	1,827	10.9	2,100	12.4
Unidentified	339	2.0	100	0.6	116	0.7	129	0.8	159	1.0	147	0.9
TOTAL ALL GROUPS	17,186	100.0	17,254	100.0	16,997	100.0	16,819	100.0	16,713	100.0	16,869	100.0

SOURCE: AAMC, Minority Students in Medical Education, Facts and Figures IV, Washington, DC, 1988.
Data for 1988 were obtained through personal communication with AAMC.

* First-year enrollment includes new entrants, repeating and continuing students.

Table VI-A-9. APPLICANTS, FIRST-YEAR ENROLLMENT, TOTAL ENROLLMENT, AND GRADUATES IN U.S. SCHOOLS OF OSTEOPATHIC MEDICINE, BY GENDER: SELECTED ENTERING YEARS 1968-1988

	APPLICANTS			FIRST-YEAR ENROLLMENT			TOTAL ENROLLMENT			GRADUATES		
ENTERING YEAR	TOTAL NUMBER	NUMBER OF WOMEN	PERCENT WOMEN	TOTAL NUMBER	NUMBER OF WOMEN	PERCENT WOMAN	TOTAL NUMBER	NUMBER OF WOMEN	PERCENT WOMEN	TOTAL NUMBER	NUMBER OF WOMEN	PERCENT WOMEN
1968	N/A	N/A	N/A	521	21	4.0	1,879	53	2.8	427	8	1.9
1978	3,530	610	17.3	1,322	222	16.8	4,221	688	16.3	1,004	163	16.2
1980	3,786	804	21.2	1,496	329	22.0	4,940	971	19.7	1,151	202	17.5
1981	3,885	901	23.2	1,582	378	23.9	5,304	1,108	20.9	1,017	186	18.3
1982	3,917	965	24.6	1,682	428	25.4	5,822	1,317	22.6	1,317	261	19.8
1983	4,045	1,092	27.0	1,746	460	26.3	6,212	1,526	24.6	1,287	262	20.4
1984	4,126	1,168	28.3	1,750	511	29.2	6,547	1,707	26.1	1,474	344	23.3
1985	3,869	1,102	28.5	1,737	489	28.2	6,608	1,799	27.2	1,560	392	25.1
1986	3,515	1,010	28.7	1,724	471	27.3	6,640	1,853	27.9	1,587	412	26.0
1987	3,326	1,002	30.1	1,692	490	29.0	6,586	1,904	28.9	1,564	441	28.2
1988	3,030	966	31.9	1,772	570	32.2	6,606	1,985	30.0	1,572	438	27.9

SOURCE: AACOM, Annual Statistical Report, Rockville, MD., 1985, 1986 and 1988.
Data for 1988 were obtained through personal communication with AACOM staff.

Table VI-A-10. FIRST-YEAR ENROLLMENT IN U.S. SCHOOLS OF OSTEOPATHIC MEDICINE, BY ETHNIC GROUP: SELECTED ENTERING YEARS 1980-1988

Entering Year

	1980		1982		1984		1986		1987		1988	
Group	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
White, Non-Hispanic	1,397	93.4	1,555	92.4	1,590	90.9	1,560	90.5	1,479	87.4	1,469	82.9
Black American	40	2.7	38	2.3	42	2.4	26	1.5	38	2.2	83	4.7
Hispanic	18	1.2	33	2.0	54	3.1	56	3.2	60	3.5	81	4.6
American Indian/ Alaskan Native	8	0.5	10	0.6	17	1.0	9	0.5	7	0.4	8	0.5
Asian American/ Pacific Islander	33	2.2	46	2.7	47	2.7	73	4.2	108	6.4	131	7.4
TOTAL	1,496	100.0	1,682	100.0	1,750	100.0	1,724	100.0	1,692	100.0	1,772	100.0

SOURCE: AACOM, Annual Statistical Report, Rockville, MD., 1985 and 1988.
AACOM News Release, January 27, 1989.

Table VI-A-11. First-Year Enrollments and Graduates of Allopathic and Osteopathic Medical Schools: 1981-1982 Through 2019-2020

Academic Year	First-Year Enrollments			Graduates		
	Total	MD	DO	Total	MD	DO
1981-1982	19,453	17,871	1,582	17,002	15,985	1,017
1982-1983	19,491	17,809	1,682	17,141	15,824	1,317
1983-1984	19,368	17,622	1,746	17,614	16,327	1,287
1984-1985	19,171	17,421	1,750	17,793	16,319	1,474
1985-1986	19,186	17,426	1,737	17,685	16,125	1,560
1986-1987	18,880	17,156	1,724	17,481	15,836	1,587
1987-1988	18,710	17,018	1,692	17,511	15,947	1,564
1988-1989	18,675	16,983	1,692	18,060	16,444	1,616
1989-1990	18,572	16,880	1,692	17,960	16,362	1,598
1990-1991	18,470	16,778	1,692	17,806	16,269	1,537
1991-1992	18,369	16,677	1,692	17,681	16,169	1,512
1992-1993	18,268	16,576	1,692	17,626	16,069	1,557
1993-1994	18,268	16,576	1,692	18,529	15,969	1,557
1994-1995	18,268	16,576	1,692	17,426	15,869	1,557
2019-2020	18,268	16,576	1,692	17,331	15,774	1,557

NOTE: For allopathic schools, first-year enrollments are actual, 1981-1982 through 1987-1988 and are projected under the basic assumption 1988-1989 through 2018-2019; graduates are actual, 1981-1982 through 1987-1988 and are projected under the basic assumption 1988-1989 to 2019-2020. M.D. first-year enrollments include students transferring from 2-year schools, from other degree programs, and from foreign medical schools. For osteopathic schools, first-year enrollments and graduates are actual, 1981-1982 through 1987-1988 and are projected under the basic assumptions 1988-1989 through 2019-2020.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions.

Table VI-A-12. Supply of Active Physicians (MD and DO)
by Country of Medical Education
Estimated for Base Year 1986, and Projected Basic Series, 1987-2020

Category	Estimated [a]	Projected			
	1986	1990	2000	2010	2020
		Number of Active Physicians [d]			
All Active Physicians	544,830	601,060	721,600	810,160	848,620
MDs	522,020	573,310	682,120	759,630	789,560
U.S. Trained	398,880	439,890	527,960	599,620	635,440
Canadian Trained	7,200	7,540	7,540	7,530	7,510
Foreign Trained [b]	115,940	125,870	146,610	152,480	146,610
DOs	22,810	27,750	39,480	50,530	59,060
Total U.S. Trained [c]	421,690	467,640	567,440	650,150	694,500
		Number per 100,000 Population			
All Active Physicians	224.9	240.0	269.0	286.7	288.3
MDs	215.5	228.9	254.3	268.8	268.2
U.S. Trained	164.7	175.7	196.8	212.2	215.9
Canadian Trained	3.0	3.0	2.8	2.7	2.6
Foreign Trained [b]	47.9	50.3	54.7	54.0	49.8
DOs	9.4	11.1	14.7	17.9	20.1
Total U.S. Trained [c]	174.1	186.7	211.5	230.1	235.9
		Percent Distribution [d]			
All Active Physicians	100.0	100.0	100.0	100.0	100.0
MDs	95.8	95.4	94.5	93.8	93.0
U.S. Trained	73.5	73.2	73.2	74.0	74.9
Canadian Trained	1.3	1.3	1.0	0.9	0.9
Foreign Trained [b]	21.3	20.9	20.3	18.8	17.3
DOs	4.2	4.6	5.5	6.2	7.0
Total U.S. Trained [c]	77.4	77.8	78.6	80.2	81.8

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[a] MDs professionally active in 1986 estimated from American Medical Association data and include approximately 90 percent of the physicians who are not classified according to activity status by the AMA and whose addresses are unknown.

[b] Includes U.S. citizen FMGs.

[c] Includes U.S. trained MDs and all DOs.

[d] Figures may not add to totals due to independent rounding.

Population Base: U.S. Bureau of Census Current Population Reports Series P-25, No. 1035, issued February 1989, and Series P-25, No. 1018, issued January 1989.

Table VI-A-13. Supply of Physicians (MD and DO) by Gender; Estimated 1980 and 1986 Projected Using the Basic Methodology, 1990, 2000, and 2020

	Estimated				Projected					
	1980		1986		1990		2000		2020	
Category	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total Active Physicians	457,500	100.0	544,830	100.0	601,060	100.0	721,600	100.0	848,620	100.0
Male	406,160	88.8	463,180	85.0	496,900	82.7	557,760	77.3	595,830	70.2
Female	51,780	11.2	81,640	15.0	104,160	17.3	163,840	22.7	252,790	29.8

SOURCES: 1980: U.S. Department of Health and Human Services. Fifth Report to the Pesident and Congress on the Status of Health Personnel in the United States. U.S. Government Printing Office, Washington D.C. March 1986. Estimates for 1986 based on data from the American Medical Association and American Osteopathic Association. Estimates of MDs reflect adjustments to include approximately 90 percent of the physicians who are not classified according to activity status by the American Medical Association and whose addresses are unknown. The number of osteopaths by gender are estimated by BHPr for 1980. 1986-2020: BHPr physician supply forecasts.

Table VI-A-14. Number of Active Physicians (MDs) a/ by Specialty and Percent Change, Projected 1986, 2000 and 2020

	Number of Physicians			Percent Change	
Specialty	1986	2000	2020	1986-2000	1986-2020
TOTAL	521,780	681,890	789,300	30.7	50.9
Primary Care	182,110	223,920	262,010	23.0	43.9
General and Family Practice	71,320	82,780	97,520	16.1	36.7
General Internal Med.	76,260	94,280	111,130	23.6	45.7
General Pediatrics	34,530	46,860	53,360	35.7	54.5
Primary Care with Ob/Gyn	215,540	268,040	314,530	24.4	45.9
Other Med. Specialties	60,700	99,170	115,820	63.4	90.8
Allergy	1,650	1,550	1,580	-6.0	-4.1
Dermatology	7,250	9,620	10,900	32.7	50.3
Cardiovascular Disease	3,510	22,640	27,790	67.6	105.7
Gastroenterology	6,310	11,330	13,420	79.6	112.7
Pulmonary Diseases	5,460	9,360	11,100	71.4	103.3
Other Internal Med. Subs. b/	21,930	38,320	43,850	74.7	99.9
Pediatric Allergy	420	330	250	-21.3	-40.4
Pediatric Cardiology	890	990	850	11.2	-4.4
Other Pediatric Subs. c/	3,270	5,030	6,080	54.2	86.2
Surgical Specialties	134,440	165,550	182,770	23.1	35.9
Colon & Rectal Surgery	750	970	1,130	29.3	50.7
General Surgery	38,690	41,650	43,020	7.7	11.2
Neurological Surgery	4,180	5,200	5,810	24.4	39.0
Obstetrics & Gynecology	33,430	44,120	52,520	32.0	57.1
Ophthalmology	15,610	19,790	22,210	26.8	42.3
Orthopedic Surgery	18,120	23,870	26,040	31.7	43.7
Otorhinolaryngology	7,630	9,380	9,950	22.9	30.4
Plastic Surgery	4,300	6,700	7,510	55.8	74.7
Thoracic Surgery	2,380	2,420	2,310	1.7	-2.8
Urology	9,350	11,450	12,207	22.5	31.2
Other Specialties	144,530	193,240	228,710	33.7	58.2
Aerospace Medicine	780	990	1,240	26.9	59.0
Anesthesiology	23,990	35,790	45,940	49.2	91.5
Child Psychiatry	4,050	4,970	5,390	22.7	33.1
Diagnostic Radiology	12,350	20,010	23,650	62.0	91.5
Forensic Pathology	300	390	520	30.0	73.3
Gen. Prevent Medicine	910	1,100	1,440	20.9	58.2
Neurology	8,560	12,750	14,560	48.9	70.1
Occupational Medicine	2,350	1,950	2,300	-16.9	-2.0
Psychiatry	33,640	39,650	45,040	17.9	33.9
Public Health	2,160	1,420	1,740	-34.2	-19.3
Physical Med. & Rehab.	3,380	5,180	6,860	53.3	103.0
Pathology	16,620	18,840	19,420	13.4	16.8
Radiology	12,720	13,110	13,930	3.1	9.5
Therapeutic Radiology	2,390	3,420	3,930	43.1	64.4
Other Specialties	20,340	33,660	42,780	65.5	110.3

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a/ These figures differ from those published by the American Medical Association since they reflect adjustments to include approximately 90 percent of the physicians who are not classified according to activity status by the AMA and whose addresses are unknown.

b/ These subspecialties are diabetes, endocrinology, geriatrics, hemotology, immunology, infectious diseases, nephrology, nutrition, oncology and rheumatology.

c/ These subspecialties are adolescent medicine, neonatal-perinatal medicine, pediatric endocrinology, pediatric hematology-oncology, and pediatric nephrology.

NOTE: Figures may not add to totals due to independent rounding.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions.

Table VI-A-15. Number of Active Physicians (MDs) by Geographic Region, Division, and State and Percent Change Estimated 1986 and Projected 1990 and 2000

	Number of Physicians a/			Percent Change	
	1986	1990	2000	1986-1990	1986-2000
UNITED STATES b/	521,770	573,070	681,920	9.8	30.7
NORTHEAST	135,140	146,740	172,920	8.6	28.0
NEW ENGLAND	36,090	40,010	49,470	24.7	55.7
Connecticut	9,380	10,250	12,310	21.3	46.8
Maine	1,940	2,170	2,720	26.8	60.8
Massachusetts	19,280	21,580	27,240	27.0	62.1
New Hampshire	1,800	1,990	2,350	21.7	47.2
Rhode island	2,300	2,470	2,940	18.7	45.2
Vermont	1,380	1,550	1,910	26.8	50.7
MIDDLE ATLANTIC	99,050	106,730	123,460	16.7	39.0
New Jersey	17,020	18,360	20,980	16.2	36.1
New York	54,750	58,400	66,680	14.8	36.0
Pennsylvania	27,280	29,960	35,800	20.9	46.7
MIDWEST	115,350	124,920	145,230	8.3	25.9
EAST MIDWEST	81,710	88,160	101,780	16.7	35.7
Illinois	26,050	28,240	33,060	18.3	36.2
Indiana	8,370	9,040	10,460	16.6	37.3
Michigan	17,230	18,380	20,670	13.9	30.5
Ohio	21,030	22,650	26,260	16.5	37.8
Wisconsin	9,040	9,860	11,330	17.9	37.8
WEST MIDWEST	33,640	36,760	43,440	19.7	41.3
Iowa	4,460	4,790	5,530	16.1	35.2
Kansas	4,630	4,990	5,850	18.1	36.3
Minnesota	9,800	10,950	13,410	25.0	50.9
Missouri	9,810	10,720	12,670	19.3	43.0
Nebraska	2,860	3,100	3,490	15.4	31.8
North Dakota	1,110	1,170	1,320	15.3	22.5
South Dakota	980	1,040	1,180	13.3	27.6
SOUTH	153,250	168,760	199,730	10.1	30.3
SOUTH ATLANTIC	84,320	92,710	109,310	20.5	44.1
Delaware	1,150	1,270	1,490	20.0	50.4
D. C.	4,580	5,010	5,980	20.1	50.9
Florida	21,130	23,090	26,680	18.6	40.6
Georgia	10,000	10,950	12,860	19.7	44.7
Maryland	16,010	17,790	21,310	22.8	46.8
North Carolina	11,040	12,140	14,350	20.5	43.1
South Carolina	5,010	5,370	6,030	15.0	30.9
Virginia	12,160	13,570	16,460	24.3	50.4
West Virginia	3,250	3,540	4,160	18.2	39.7

	Number of Physicians a/			Percent Change	
	1986	1990	2000	1986-1990	1986-2000
EAST SOUTH CENTRAL	24,520	27,000	32,050	21.1	44.1
Alabama	5,980	6,510	7,540	18.2	39.3
Kentucky	6,210	6,960	8,470	24.8	49.0
Mississippi	3,470	3,820	4,530	21.0	45.2
Tennessee	8,860	9,710	11,510	20.5	43.7
WEST SOUTH CENTRAL	44,420	49,050	58,370	21.5	44.9
Arkansas	3,480	3,850	4,500	20.7	41.1
Louisiana	7,950	8,710	10,120	19.1	40.4
Oklahoma	4,920	5,540	7,030	28.0	62.8
Texas	28,060	30,950	36,730	21.2	43.5
WEST	111,230	124,690	153,360	12.1	37.9
MOUNTAIN	24,510	27,760	34,480	28.0	56.0
Arizona	6,220	6,940	8,360	24.3	49.8
Colorado	7,540	8,550	10,460	26.9	54.0
Idaho	1,340	1,540	2,000	32.8	65.7
Montana	1,320	1,450	1,760	23.5	47.7
Nevada	1,530	1,800	2,300	36.6	57.5
New Mexico	2,760	3,200	3,200	34.1	75.0
Utah	3,090	3,470	4,350	27.2	53.1
Wyoming	720	810	1,050	30.6	63.9
PACIFIC	86,730	96,930	118,880	25.2	55.5
Alaska	860	1,060	1,540	52.3	120.9
California	7,700	75,370	91,990	24.3	54.4
Hawaii	2,550	2,850	3,450	25.1	49.4
Oregon	6,000	6,770	8,430	28.2	56.7
Washington	9,620	10,880	13,470	27.0	57.8
U. S. Possessions	6,800	7,960	9,390	17.1	38.1

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a/ These figures include about 90 percent of those MDs not classified according to activity status by the American Medical Association.

b/ Includes physicians in the U.S. possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions.

Table VI-A-16. Ratio of Active Physicians (MDs) per 100,000 Population by Geographic Region, Division, and State and Percent Change Estimated 1986 and Projected 1990 and 2000

	Number of Physicians a/			Percent Change	
	1986	1990	2000	1986-1990	1986-2000
UNITED STATES b/	210.1	223.4	247.8	6.2	17.6
NORTHEAST	270.2	303.0	372.7	11.8	37.7
NEW ENGLAND	283.3	314.2	387.2	10.6	36.4
Connecticut	294.1	327.0	402.1	10.9	36.7
Maine	165.6	176.5	207.7	6.0	25.4
Massachusetts	330.7	378.4	496.2	14.2	49.9
New Hampshire	175.6	174.5	172.3	-.5	-1.6
Rhode island	236.1	259.7	317.0	9.7	33.9
Vermont	254.5	269.2	305.4	5.5	19.6
MIDDLE ATLANTIC	265.7	299.0	367.1	12.4	38.0
New Jersey	223.4	244.4	282.5	9.4	26.4
New York	308.1	354.9	444.8	14.9	44.1
Pennsylvania	229.4	255.6	319.4	11.3	39.2
MIDWEST	194.5	207.3	243.2	6.2	24.7
EAST MIDWEST	195.8	208.1	244.4	6.1	24.5
Illinois	225.5	245.5	295.5	8.9	31.0
Indiana	152.1	159.2	184.2	4.6	21.0
Michigan	188.4	195.7	224.4	3.7	19.1
Ohio	195.6	210.4	253.6	7.2	29.7
Wisconsin	188.8	195.8	217.2	3.7	14.8
WEST MIDWEST	191.4	205.4	240.4	7.3	25.6
Iowa	156.4	160.6	186.0	2.6	18.5
Kansas	188.3	202.4	234.6	7.4	24.4
Minnesota	232.5	251.1	298.6	7.7	28.4
Missouri	193.7	211.2	249.3	8.8	28.4
Nebraska	179.0	189.2	210.2	5.6	17.3
North Dakota	162.7	172.3	193.7	5.5	19.1
South Dakota	138.3	149.2	171.5	7.2	23.9
SOUTH	171.1	184.9	194.5	4.0	9.6
SOUTH ATLANTIC	189.6	198.0	206.8	4.2	9.0
Delaware	181.4	201.0	232.7	10.5	28.1
D. C.	731.3	998.8	587.8	36.5	117.1
Florida	181.0	173.4	153.0	-3.8	-15.4
Georgia	163.7	177.3	191.8	7.9	17.1
Maryland	358.7	396.0	465.0	10.3	29.6
North Carolinia	174.4	187.6	208.9	7.5	19.5
South Carolinia	148.2	150.9	154.3	1.3	4.0
Virginia	210.2	227.6	257.7	8.1	22.4
West Virginia	169.3	173.5	201.1	2.4	18.3

	Number of Physicians a/			Percent Change	
	1986	1990	2000	1986-1990	1986-2000
EAST SOUTH CENTRAL	161.2	167.5	186.6	3.7	15.5
Alabama	147.5	154.6	170.7	4.7	15.6
Kentucky	166.5	170.8	192.5	2.4	15.6
Mississippi	132.3	138.3	154.0	4.5	15.9
Tennessee	184.6	191.4	212.4	3.3	14.6
WEST SOUTH CENTRAL	165.3	173.1	178.6	4.2	7.9
Arkansas	146.8	149.3	158.6	1.4	7.5
Louisiana	176.7	183.4	196.1	3.4	10.8
Oklahoma	149.0	158.1	178.3	6.0	19.5
Texas	168.2	176.9	177.1	4.8	4.8
WEST	228.1	235.6	245.3	3.1	7.5
MOUNTAIN	188.2	180.2	171.2	-4.2	-8.9
Arizona	187.3	173.7	149.7	-6.8	-19.7
Colorado	230.7	227.7	224.5	-1.2	-2.5
Idaho	134.1	127.0	132.5	-5.1	-.6
Montana	161.3	163.0	182.8	.6	13.0
Nevada	158.5	141.1	119.9	-10.6	-23.9
New Mexico	186.5	208.4	243.0	11.3	30.0
Utah	185.6	170.1	156.6	-8.0	-15.5
Wyoming	141.2	115.6	104.9	-17.6	-25.4
PACIFIC	242.7	258.4	280.5	6.2	15.2
Alaska	160.5	203.0	244.6	26.2	12.3
California	250.9	273.8	300.5	8.8	19.5
Hawaii	239.9	250.8	270.0	4.2	12.5
Oregon	222.3	204.1	209.3	-8.0	-5.7
Washington	215.7	217.1	231.0	.5	7.0
U. S. Possessions	185.2	216.8	275.3	16.7	48.6

a/ These figures include about 90 percent of those MDs not classified according to activity status by the American Medical Associaton.

b/ Includes physicians in the U.S. possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions.

Table VI-A-17. Comparison of Supply and Requirements for Physicians (MDs and DOs): 1986 Supply and Projections to 1990 and 2000

	Actual 1986	Estimated 1990	Projected 2000	Percent Change 1986-2000
Supply				
Total Physicians	544,590	600,800	721,370	+32.5
Total Primary Care	197,110	213,100	251,610	+27.7
Total Nonprimary Care	347,480	387,700	469,760	+35.2
Requirements				
Total Physicians	N/A	585,590	671,360	+23.3
Total Primary Care		209,550	233,620	+18.5
Total Nonprimary Care		376,040	437,740	+26.0
Excess of Supply over Requirements				
Total Physicians	N/A	15,210	50,010	N/A
Total Primary Care		3,540	17,990	
Total Nonprimary Care		11,660	32,020	

SOURCE: Health Resources and Services Administration, Bureau of Health Professions. Supply forecasts are from the BHPr supply model basic series of estimates; requirements estimates are from the BHPr physician requirements forecasting model.

Chapter VII

DENTISTRY

There are changes occurring in dentistry today that have important implications for the future of dental education and manpower. Dental disease patterns are changing. Dental decay in children has dropped dramatically. The human immunodeficiency virus (HIV) infection and the later stages of the disease acquired immunodeficiency syndrome (AIDS) are changing the standard of care for infection control. Advances in dental technology and in new restorative materials that are more durable, cosmetic, and easier to use are allowing the dentist to be more productive. What implications these changes may have for dental practice, particularly the use of dental services remains unclear.

Also the Nation's total population is not only increasing, but aging rapidly. The elderly require different types of dental services than are provided for children and younger adults. A complicating factor is that the number of applicants and enrollments at dental schools, critical to the supply of dental manpower, have decreased.

Developments in Health Personnel Supply

In 1988 approximately 142,200 active civilian dentists, 1.6 percent more than in the present year,were practicing in the 50 States and the District of Columbia. Approximately 5,000 were in the Armed Services. While the number of dentists has steadily increased during the past several decades, the largest growth has occurred since 1970.

There has been an increase in the dentist-to-population ratio as well (figure VII-1). Growth in the ratio of active civilian dentists to population has continued since 1965 and in 1988 reached its highest level (58 per 100,000), a reversal of the trend of the 1950s and early 1960s when rapid growth of the population outpaced the increase in number of dentists and the dentist-to-population ratio actually declined. The projected supply of dentists to the year 2020 is discussed under the Dentist Supply Projections Section of this chapter.

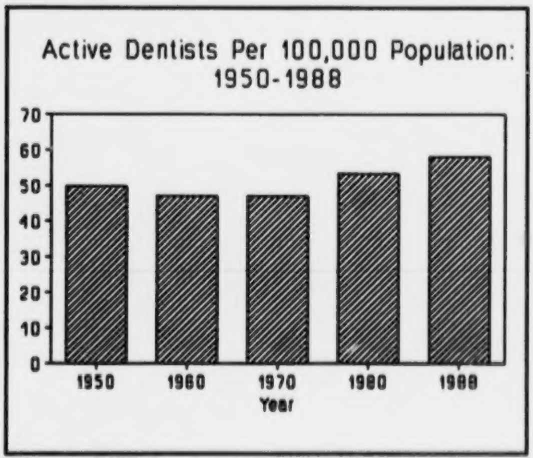

Figure VII-1

Specialization

An increasing number of dentists are practicing as specialists in one of the eight American Dental Association (ADA) recognized specialties. The number of dental specialists increased approximately 2.5 times since 1970, from 9,320 in 1970 to 23,700 in 1987, a proportionately higher increase than that in the total number of general practitioners over the same time period. Specialists now are approximately 16 percent of all active dentists. As figure VII-2 shows, the increase in the ratio of specialists to population has more than doubled, from 4.5 per 100,000 in 1970 to 9.7 per 100,000 in 1987.

Orthodontists are the largest number of specialists, 7,120 practitioners or 32 percent of the total number of specialists. Oral and maxillofacial surgery is the second largest specialty with 4,719 practitioners, 20 percent of all dental specialists. Periodontic and pedodontic specialties have an estimated 3,330 and 3,050 practitioners, respectively, followed by 2,320 endodontists and 2,390 prosthodontists. Oral pathologists and public health dentists have had a modest growth of less than 2 percent of all dental specialists.

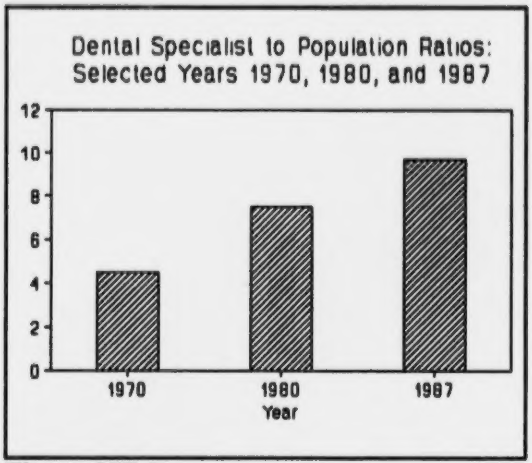

Figure VII-2

A 1987 American Association of Dental Schools (AADS) survey of dental school seniors disclosed that one of three seniors plan to pursue postgraduate training immediately upon graduation (AADS, 1988). Similarly, data from the ADA's 1988-89 Annual Survey on Advanced Dental Education show that nearly 36 percent of the 1988 first-year advanced specialty class are 1988 dental school graduates (ADA, 1989). These surveys reveal a continuing upward trend in the number of dentists expressing interest in specialization. Although the demand for specialty training is increasing (based upon the number of applicants), the actual number receiving this training is limited by the number of available postgraduate programs, which has remained fairly constant for the past several years.

Geographic Distribution

The regional distribution of dentists, expressed in terms of dentist-to-population ratios, continues to vary widely. In 1987 the Northeast Region had the highest dentist-to-population ratio with 69.3 active civilian dentists per 100,000 population. West and Midwest followed with 61 and 60.7 active civilian dentists per 100,000 population respectively. The South was significantly lower with 46.8. Supply and distribution projections for dentists predict a continued increase in the dentist-to-population ratio for all regions with the South expected to achieve the greatest relative change during the next ten years. For individual states, California has the most dentists (16,800) and Wyoming has the fewest (230).

As of December 31, 1988, 793 sites were designated by the Bureau of Health Care Delivery and Assistance as dental manpower shortage areas. A shortage area is defined as a designated area with a dentist-to-population ratio of 1:5,000 (1:4,000 where high needs are indicated) or greater. Approximately 16 million people live in these designated areas. The number of additional dentists required to achieve the minimum population ratio nationwide is 1,729. Little change has been observed in the past few years either in the number of sites designated or the estimated number of dentists needed to serve these designated sites.

Female Dentists

The percentage of female dentists practicing today is higher than at any other time in history. According to estimates by the Bureau of Health Professions there were more than 11,300 female dentists in the United States in 1988, approximately 7.6 percent of the total. In the past century the percentage of female dentists has generally fluctuated between 1 and 2 percent. The recent gain in the number and percentage of female dentists appears to be sustainable based upon the trends in the number and percent of female enrollees in dental schools. Projections suggest that by the year 2000, female dentists will comprise approximately 16 percent of the total dentist supply in the United States. As shown in figure VII-3, by the year 2020 the total number of female dentists will have nearly doubled.

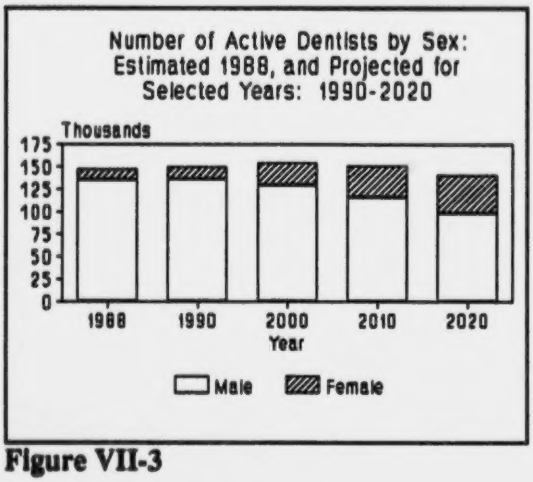

Figure VII-3

The growth in the number of female dentists may partly be due to the fact that women have many more career options than before and no longer see themselves as restricted to traditional women's careers. A 1986 survey conducted by the American Council on Education and the University of California at Los Angeles found that, for the first time, more women were choosing careers in previously male dominated occupations such as medicine and dentistry than in the more traditional female occupations such as nursing.

Black, Hispanic and Asian Dentists

In 1988 the Bureau of Health Professions reported in Education and Selected Practice Characteristics of Black Dentists that in 1985 there were an estimated 3,800 Black dentists (including 800 Black female dentists) 2.6 percent of the total number of active dentists (DHHS, 1988a). The percentage of Black female dentists is expected to increase at a faster rate than that of Black male dentists.

The total number of Black graduates from dentistry schools has remained relatively constant during the past decade, while the numbers of Asians and Hispanics have shown substantial gains. According to the 1986 Bureau of Health Professions report Estimates and Projections of Black and Hispanic Physicians, Dentists, and Pharmacists to 2010, the number of Black dentists is expected to reach 6,300 by the year 2000 if the present rate of enrollment is sustained (DHHS, 1986). The number of Hispanic dentists is expected to increase to 4,200 during the same period.

Characteristics of Private Dental Practice

The private practice of dentistry remains the predominant means for delivering dental services, and sole proprietorship remains the most common form of dental practice ownership with approximately 105,000 active private practitioners owning their own practices. Although solo dental practice is the most common form of dental practice, in the past few years there has been an increase in the number of dentists associating with a partnership or group practice. According to a recent AADS Survey of Dental Seniors, in 1979, 18.7 percent of the students went into solo practice, compared with only 7.4 percent in 1987 (AADS,1988). In 1979, 15 percent bought into a partnership or group practice compared with 13.9 percent in 1987. The biggest change during this period has been the growing number of graduating seniors employed by a private or group practice or a health maintenance organization (HMO). In 1979 only 21.3 percent chose this option compared with 33.3 percent in 1987. This employment trend, which is particularly pronounced among younger dentists, may be associated with education-related indebtedness and high cost of setting up a solo practice.

The primary sources of revenue for dentists are direct patient payment and private insurance, accounting for 48.7 percent and 46.1 percent of revenue respectively. Dental specialists receive a proportionately higher percentage of their income from direct payment than general practitioners, 58.7 percent versus 45.4 percent, and a proportionately smaller percentage from private insurance, 39.9 percent compared to 49.1 percent. Government programs provide approximately 4.4 percent of the gross revenue for all dentists.

The mean net income of dentists during the very early years of practice often provides little more than is necessary to cover basic expenses of the practice, but earnings rise rapidly as the practice develops. According to the 1988 ADA Survey the average annual net income in 1988 of dentists in private practice was $73,210 and for specialists was $113,460 (ADA, 1988h). For both general practitioners and specialists, the highest income was earned by those in the 45-49 age group.

Changes in overall economic conditions affect the practice of dentistry in general. During the latter part of the 1970s and early 1980s net incomes of dentists did not keep pace with inflation. Since 1984 dentists' net income has increased faster than the rate of inflation. Net incomes for 1989 are expected to continue the five-year trend. This trend is due in part to stabilization of patient loads, patient demand for more expensive services, and moderate practice costs. These trends, if sustained, suggest a more favorable economic climate for dentists over the next 10-20 years.

Dental Education

Dental Applicants and Enrollees

The number of applicants to dental schools has decreased steadily since 1975. There were 5,397 applicants to U.S. dental schools for the 1987-88 entering class. Of these, 4,176 students were enrolled, an applicant-to-enrollee ratio of 1.3 to 1. Compared with the 1986-87 applicant pool, this is a 5.7 percent decrease in the number of applicants and a 3.0 percent decrease in the number of first-year enrollees. Furthermore, the number of applicants and first-year enrollees in academic year 1987-88 fell, resulting in a 34 percent and 66 percent decrease, respectively, since the peak years of 1975-76 for applicants (15,734) and 1978-79 for first-year enrollees (6,301). Table VII-1 also shows the number of female applicants and enrollees for the 1987 entering class: 1,801 and 1,355, respectively.

Table VII-1

Dental School Applicants and Enrollees
1986 and 1987

	1987	1986
Applicants		
Total	5,397	5,724
Female	1,801	1,790
Percent female	33.4	31.3
Enrollees		
Total	4,176	4,306
Female	1,355	1,303
Percent female	32.4	30.3
Applicant-enrollee ratio	1.3	1.3

These numbers represent both an absolute and percentage increase over the 1986 figures. Since 1969, when females were only 1.6 percent of first-year students, the percentage of female applicants and enrollees has steadily increased. In 1988, the percentage of female enrollees was 33.3 (1395 of 4196 enrollees).

Table VII-2

Dental Applicants by Ethnic Group
1986 and 1987

Ethnic Group	1987 No.	1987 % Dist.	1986 No.	1986 % Dist.	%Change 87-86
American Indian	44	0.8	10	0.2	340.0
Asian/Pacific Islander	807	15.0	663	11.6	21.8
Black	357	6.6	382	6.7	-6.5
Hispanic	444	8.2	435	7.6	2.1
White	3,638	67.4	4,130	72.2	-11.9
No Response	107	2.0	104	1.8	2.9
Total	5,397	100.0	5,724	100.0	-5.7

In 1987 the number of American Indian, Asian and Hispanic applicants to dental schools increased resulting in increases in the number of enrollees from each group (table VII-2). This is especially significant in a period of a declining applicant pool (table VII-3). Applications from Blacks and Whites decreased by 6.5 percent and 11.9 percent, respectively. White enrollment declined by 10.5 percent, while Black enrollment declined by only 0.8 percent.

Over the past 18 years the percentage of Black applicants has declined slightly. In contrast, Asian and Hispanic applicants have increased. In 1977 Hispanics comprised 2.9 percent of the applicant pool and 1.8 percent of the first-year class. In 1987 they accounted for 8.2 percent of the pool and 8.1 percent of the class. The most dramatic growth has been in the number of Asian students. In 1977 Asians comprised 4.5 percent of the applicant pool and 3.8 percent of the first-year class. In 1987 they accounted for 14.9 percent of the applicants and 14.7 percent of the enrollees.

There were 4,581 graduates from 58 dental schools in 1988; the total number of dental students was 17,885. The number of graduates continues a downward trend that began in the early and middle 1980s. The dental student attrition rate has been declining since the mid 1980s. Attrition is generally the result of a combination of personal and academic considerations by those few students who transfer or drop out.

Table VII-3

Dental Enrollees by Ethnic Group
1986 and 1987

Ethnic Group	1987 No.	1987 % Dist.	1986 No.	1986 % Dist.	%Change 87-86
American Indian	32	0.8	10	0.2	220.0
Asian/Pacific Islander	615	14.7	486	11.3	26.5
Black	242	5.8	244	5.7	-0.8
Hispanic	339	8.1	296	6.9	14.5
White	2,870	68.7	3,208	74.5	-10.5
No Response	78	1.9	62	1.4	25.8
Total	4,176	100.0	4,306	100.0	-3.0

The academic curriculum in dental schools focuses on preparing the practitioner to meet the challenges of the 1990s as dental disease patterns change and the population ages. All dental schools have geriatric curriculum components to better train dental students in geriatric dentistry. The dental curriculum also has concentrated on the area of infection control, especially in regard to Hepatitis B and HIV/AIDS. The AADS, with Federal grant support, is developing an updated curriculum specifically for teaching guidelines in the area of HIV/AIDS.

The indebtedness level of dental school graduates has risen slowly in the 1980s to an average of $39,000 by 1987. The average debt of all graduating dental students more than doubled from 1979 to 1984, and since 1984, has increased an average of 6 percent annually. Adjusted for inflation, the annual increase since 1984 has been 3 percent. The percentage of dental students taking out Guaranteed Student Loans (GLS) in 1987 was about 50 percent, and 19 percent in 1987 borrowed through the Health Education Assistance Loans (HEAL) program. From 1983 through 1987 the percentage taking out GSLs varied from 50 to 37 percent, and the percentage taking out HEAL loans varied from 30 to 19 percent.

Future of Dental Manpower

Dentist Supply Projections

The Bureau of Health Professions uses a computer-based dental manpower supply model to project the future supply of active dentists. The primary function of the model is to estimate the number of dentists entering and leaving the dental profession over the projection period. Because of uncertainties about future enrollments, this report presents three different projection levels for the supply of active dentists to the year 2020. Different assumptions with different outcomes are made for each projection level on how many new graduates (estimated from first-year enrollment levels after accounting for attrition) will enter the profession annually over the projection period.

The different assumptions used in these projections are made with full knowledge that forecasting with an acceptable level of certainty becomes more difficult the further projections are made into the future. A few examples that may result in adjustments to any assumptions made currently include: (1) uncertainties about future general economic conditions - which can have a profound effect on the profession when dentistry is perceived by many people as a discretionary expense; (2) economic challenges facing dental schools that may result in future class size reductions or school closures; (3) the impact changing disease patterns may have on the demand for dental care; (4) changing demographics where efforts may shift from children and adults to maintenance of the restored dentition of adults and the elderly; (5) future applicant pools; (6) future dental research; and (7) new technologies and advances in dental materials.

Each projection level assumes that the number of female enrollees will continue to increase gradually until 1995 at the rate of 1 percent per year, which is a little more than half the rate of the last 10 years. First-year enrollments of women in dental schools comprised approximately

33 percent of all first-year enrollments in 1988 and are projected to increase gradually to approximately 40 percent by 1995 and remain at that level for the rest of the projection period.

Basic Projection Level

During the past decade first-year enrollments have decreased at an average annual rate of 4 percent. The basic (most likely) projection of the future supply of dentists assumes that the number of first-year students will continue to decrease during the next 10 years, but moderate at an average rate of 2 percent per year until reaching 3,196 in 1998 and then stabilize at that level through 2020. The projected decline is due primarily to continuing economic and demographic factors influencing the size of the applicant pool. For example, increasing costs of a dental education, high costs of starting a dental practice, malpractice insurance problems, and perception by many potential applicants that the economic prospects for a career in dentistry are less attractive today. These factors, coupled with the significant reduction in tooth decay and concern about the perceived danger posed by the new wave of communicable diseases including herpes and AIDS, influence the size of the future applicant pool.

Demographic factors also contribute to the continued downward trend in first-year enrollments as shown in figure VII-4. These include the decreasing college-aged population in the United States resulting in fewer potential applicants and increasing competition by other business and science based occupations for the same applicant pool.

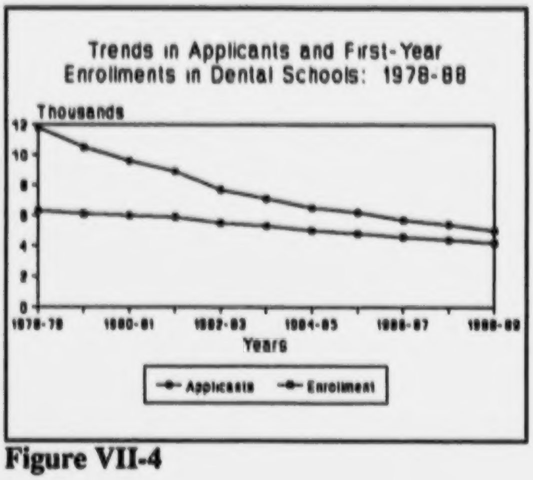

Figure VII-4

Several positive influences are expected to occur that will help moderate and later stabilize the decline of first-year enrollments by 1998. The total United States population, especially the elderly, will continue to grow, increasing demand for dental services. The ADA estimates that there will be about 1,000 patients per active dentist by the year 2000, up from the 25-year low of 981 patients per dentist projected for 1989. National dental health care expenditures are expected to increase substantially by the year 2000 and beyond, indicating long-term growth in the health care market place. Insurance carriers, corporations, and labor groups are actively developing and marketing dental capitation benefit plans. The 21 to 24 year-old cohort will increase by the turn of the century until the end of the projection period, and the projected dentist-to-population ratios will decline. Also, the ADA and AADS combined efforts to recruit and stabilize the applicant pool, and the ADA's 'Smile America' dental health awareness campaign are all positive influences that have been factored into the supply model's basic assumptions.

As a result of the above factors the number of active dentists is projected to grow from 147,200 in 1988 to a peak of 154,600 in 1999 and then to decrease to 140,700 by 2020. The ratio of active dentists-to-population is expected to decrease slightly from 58.0 per 100,000 in 1988 to 57.6 per 100,000 in 2000 and then to decline steadily to 47.8 per 100,000 by 2020.

The number of males active in the field is expected to decrease from 135,481 in 1988 to 129,878 by 2000 and to 98,296 by 2020. The number of females active in dentistry will increase from 11,348 in 1988 to 42,451 by 2020, nearly a four fold increase.

Low Projection Level

A low projection level of dentist supply also has been developed primarily to show what would happen if the decrease in the first-year enrollment trend for the last 10 years were to continue before stabilizing in 1998. In this projection it is assumed that the number of first-year students will drop to 4,196 in 1987-88, the same as in the basic projection, but will continue to decrease at the present average rate of 4 percent in each subsequent year until it stabilizes at 2,096 in 1998. It is assumed that this level will be maintained until the end of the projection period. This scenario suggests that the low projection level is unrealistic because a continuation of the current first-year enrollment decline would adversely affect the dental education system to the point where more dental schools close and the profession could not meet the anticipated increase in demand for dental services in a growing population.

This projection assumes a continuing drop in applicants, which will lead to more dental school closings (one recently was announced by Fairleigh Dickinson University) or first-year class size reductions, a declining rate of return for a dental education, and rapidly increasing opportunities for potential dental school applicants in other scientific fields.

In the low series the number of active dentists peaks at 153,355 in 1997 and then decreases to 145,001 in 2010. By 2020 this number would drop further to 130,855 and result in a ratio of 44.4 active dentists per 100,000 population. In the low projection level the number of active dentists would be 9,892 fewer than the basic estimate by the year 2020.

High Projection Level

The projected high level for the dentist supply assumes that the number of first-year enrollments will remain constant at the 1988 level of 4,196 throughout the projection period. This projection is predicated upon the declining applicant pool stabilizing or increasing moderately through successful efforts of dental schools to attract and recruit students, successful public promotion campaigns by the ADA, and generally positive economic and demographic factors. The high level expects that the number of active dentists will peak at 164,465 in 2011 and then decrease to 161,397 by 2020, a ratio of 54.8 active dentists per 100,000 population. At the end of the projection period the number of active dentists in the high projection level would exceed the number in the basic projection level by 20,650 or 14.6 percent.

Dental Manpower Requirements

There has been a substantial improvement in the dental health of children in the United States over the past two decades. Surveys on dental caries prevalence conducted by the National Institute of Dental Research (NIDR) have shown a continuing decline in tooth decay in American children. In 1980, 36.6 percent of U.S. schoolchildren were caries free. This compares to an estimated 28 percent with no tooth decay in the early 1970s. Evidence that tooth decay is continuing to decline comes from a nationwide survey conducted by the NIDR during the 1986-87 school year (DHHS, 1988f). This survey shows that 49.9 percent of all children are free of decay in their permanent teeth. Although the survey did not address the reasons for the decline in dental caries, it is believed that preventive measures such as dental sealants and the widespread use of fluoride in community water supplies, tooth pastes, and other forms are mainly responsible.

The recent National Survey of Oral Health of U.S. Adults included examination of approximately 21,000 adults (15,000 employed adults and 6,000 seniors) between 18 and 103 years of age, a sample of approximately 100 million Americans between the ages of 18 and 65 and approximately 4 million Americans 65 years and older (Miller et al., 1987). Included were questions about tooth loss, dental caries, and periodontal disease. The survey found that in the employed population between 18 and 64+ years of age, 49 percent had, at most, one tooth missing and 4 percent were edentulous. In the senior population 41 percent were edentulous and only 2 percent had all of their teeth. Comparing the prevalence of edentulism in the current survey to that reported by the National Center for Health Statistics in 1960, the current sample had less edentulism at every age interval.

In assessing dental caries in adults the survey measured coronal and root caries. It showed little difference between employed and senior adults in prevalence of decay on the crowns of teeth. In general, both employed and senior U.S. populations appear to have a very high level of restorative care for coronal caries as over 92 percent of carious surfaces had been restored.

For the first time root surface caries in adults was measured nationally. In the employed population the percentage of persons with at least one carious or filled root surface ranged from 7 percent at age 18-19, to 54 percent at age 60 and above. In the senior population 67 percent of men and 61 percent of women had root surface lesions with almost 66 percent unrestored in men and 38 percent unrestored in women.

Pathogenesis of periodontal disease is progressive from early gingivitis to periodontitis leading to periodontal pockets and bone loss. The majority of adults surveyed showed some level of periodontal disease. For example, 77 percent of employed adults and 95 percent of seniors had at least one site with periodontal attachment loss. Twenty-four percent of employed adults and 68 percent of older persons suffered from more severe periodontal conditions.

The picture of dental health is perhaps clearer today than at any other time. We can generally conclude that dental health of most younger Americans is improving, employed adults are retaining their teeth at a significantly higher rate than the elderly, and that dental health promotion and disease prevention are benefiting more people than ever before. However, while real improvements are taking place in the Nation's oral health, there are gaps to be addressed. Surveys of homeless, unemployed, minority population groups, and migrant workers are needed. These groups would likely present a significantly different profile than the groups recently surveyed.

How the general improvement in oral health will affect demand for dental services remains uncertain. It is clear, however, that the differences noted in oral health status between generations and changing demographics of the population will require the dental profession to provide a different mix of dental services in the future. For example, dental services will be shifting from children to the elderly, who generally require more complex dental procedures (endodontics, fixed bridgework and partial dentures). Restoration of root caries, maintenance of the high level of restored teeth, periodontics, and oral pathology all present special needs in this group. Also, rapid growth in the number of dentists during the past is mostly over, as seen by declining enrollments and dental school changes. Substantial reductions in the future aggregate supply of dentists can be expected and, as in the general population, the dental profession is getting older (by the year 2000, almost 25 percent of all active dentists are expected to be over age 67 and typically less productive). To provide care for the growing patient population, many dentists may need to expand their practices. The efficiency and total productive capacity of the dental sector can also be significantly altered by adjustments in staffing and organization of dental practices. How all of these factors will sort out is unclear, and only future research will provide the necessary level of information to allow for improvements in the confidence levels of future forecasts.

Economic Outlook for and Employment of Dental Manpower, 1988-2000

Forecasting the future of the dental care sector involves knowledge of current and predictions of future cause and effect relationships of producing and consuming dental services within the framework of our national economy. The Bureau of Health Professions' Econometric Model of the Dental Sector (EMODS), the principal method of forecasting manpower requirements, was developed in the 1970s to provide forecasts on a broad range of dental sector variables.

The model is currently undergoing major revisions to incorporate the above discussed clinical and epidemiological developments such as the decline in caries among the young combined with the need for more care in coming decades for the older generation. It will also attempt to incorporate changing economic conditions such as the rise in dental insurance and in practice characteristics and environment that will impinge on future demand for dental care. Due to the current effort, which will substantially change and recalibrate the model to more accurately reflect the recent developments noted above, forecasts will be presented to the year 2000 only, as contrasted with projections through 2015 in the 1988 report.

The major components of this economic equilibrium model are demand for and supply of dental services. Interaction between these components causes the cost of dental care to move to a level where dental services supplied equal those demanded. The model results in calculated future values for expenditures for dental services, cost and number of dental services, number of dentists, utilization of services, levels of dental income, price of equipment and supplies, and employment levels of dental auxiliaries. EMODS forecasts are produced within the model's framework of interactive mathematical equations under specific assumptions about future underlying conditions and governmental policies that affect these variables. A detailed description of the model is contained in the literature (DHEW, 1980; Hixson, 1981).

The decade of the 1980s represents a period of rapid change for dentistry, as well as in the general economy, which adds to the difficulty of forecasting national economic performance--an important factor in the demand for dental care. Forecasts of national expenditures for dental care generated by EMODS are influenced significantly by projected real economic growth. In addition, the model's parameters for the demand equation for dental services are estimated from historical data on dental care spending. Therefore, it is important that the national expenditure measurements be as accurate as possible. Two such expenditure series are widely used--the HCFA and the NIPA series, and a different demand equation will result from the selection of one or the other expenditure series. Both have been used in the previous report; this report uses the NIPA data (see technical note VII-1 at the end of this chapter for details concerning the selection of expenditure data from the National Income and Product Accounts (NIPA) of the Department of Commerce).

Changes in population demographic composition, in values that the general population places on dental services, in labor markets (where dentists and dental auxiliaries assess their alternative career choices), in financing mechanisms (out-of-pocket payments versus dental insurance), in underlying rates of dental diseases, and in the legal and regulatory climate for dentistry affect the underlying assumptions for EMODS. In the analysis of recent changes in dental expenditures, it is especially important to go beyond the usual determinants of demand (prices, incomes, etc.) to allow for the rising influence of third-party payments - some form of dental expense insurance covered 18.7 million Americans in 1972 versus 53.5 million in 1977 (Health Insurance Institute). In 1986 over one-third of dental expenditures were paid by dental insurance, which covered two-fifths of the population (Beazoglou et al., 1989).

Additional variables must be specified prior to executing the model. They include estimates of the civilian population, level of real per capita income for the nation, rate of technological progress in the average dental practice, and number of graduates from dental schools over the forecast period. The assumptions employed in deriving the values of these variables are discussed in technical note VII-2 at the end of this chapter.

Forecast Results. Two forecasts produced by the model are presented in table VII-A-7 for the period to 2000 (based on alternative long-run economic assumptions). These forecasts should be viewed as quantitative estimates of trends and turning points for important variables over the forecast period rather than predictions of actual values realized for those variables each year. They show the indexed forecast of real dental prices, total dental care spending in the economy, and spending per dentist (base year 1988). All measures are in "real" terms; that is, annual data have been adjusted for inflation by dividing by the overall consumer price index.

Total real expenditures on dental services is taken as a measure of level of economic activity in the industry; their rate of growth reflects the health of the industry (Gotowka, 1985). Forecasts for the explanatory demand variables (per capita income and population) predict that they will increase over the forecast period in both scenarios, thus increasing demand for dental care.

Table VII-4 compares projected growth of total real dental care expenditures for the period 1985-2005 with historical growth over previous periods of time:

Table VII-4

Actual and Forecast Percent Growth,
Total and Per Capita Real Dental Care Expenditures
1965-2005

	Percent Growth Real Dental Care Expenditures (NIPA)	
Period	Total	Per Capita
1965-1975	64	47
1975-1985	46	32
1985-1995 forecast*	41	29
1995-2005 forecast*	37	30
1995-2005 forecast**	25	18

* Scenario One
** Scenario Two (lower economic growth)

Note: This table goes beyond 2000 to 2005 to allow for 1995-2005 comparisons with prior 10-year periods.

The 41 percent increase in total spending over the 1985-1995 forecast period is 5 percent below the growth in the dental sector over the prior 10 years. The 37 and 25 percent increases forecast for Scenarios One and Two respectively, for 1995-2005 are even lower. Scenario Two reflects lower economic growth assumptions.

The table also displays real per capita dental care expenditures. The 29 percent increase in real per capita dental care spending over the 1985-1995 period is 3 percent below the industry growth over the prior 10 years. The 30 percent increases forecast for 19195-20055 in Scenario One is virtually the same as for the prior 10 years, while Scenario

Two's 18 percent per capita increase is 11 percent below 1985-1995, due to its lower economic growth assumption.

In EMODS the real cost of dental care is a direct indicator of how demand for dental care will grow relative to supply. In the 1970s a general decline in the real cost of dental services showed that over the decade supply of dental services (and dentists) was growing faster, on average, than demand. A reversal of the trend occurred in 1984, and the dental component of the Consumer Price Index (CPI) has continued to increase more rapidly than the rate of the overall index ever since. According to the forecast from both scenarios the increase in dental prices will continue as demand for dental services grows relative to supply for the remainder of the century, although dental cost will increase at a lower rate under Scenario Two.

The prediction that growth of total demand will exceed growth of total supply for dental services rests on two key assumptions: sustained economic growth, which is the main ingredient to prosperity of the dental sector, and growth in dentist productivity, which has slowed from the high historical levels of the 1970s to a more sustainable rate that will average 0.5 percent annually. The implication of the long-run economic outlook for the dental sector from the viewpoint of practicing dentists is shown in table VII-A-7 by the forecast trend of real expenditures per dentist, positive under both scenarios.

Of importance to the interpretation of these scenarios is the lack of future growth in supply of dentists relative to demand. Although supply of dentists continued to expand both in absolute and per capita terms during the 1970s and 1980s, this pattern is not likely to continue during the latter half of the 1990s. Per capita supply of dentists is expected to decline in the early 1990s with the actual number peaking at approximately 154,600 by the year 2000.

Uncertainties Underlying the Forecasts Both scenarios forecast, for the remainder of the century, a continuing growth in demand for dental services (albeit significantly lower than historically experienced), at a rate faster than the productive capacity (supply of dentists and dental auxiliaries) of the dental sector. This results in an upward trend in real overall and per capita expenditures per dentist. In assessing these EMODS' forecasts, however, the reader must recognize the uncertainties of the scenarios' basic assumptions of sustained U.S. economic growth and stable environmental conditions within the dental industry throughout the forecast period.

Summary

o *The present forecast of the EMODS model (see table VII-A-7) is for relatively faster growth in demand for dental services than in productive capacity of the dental sector over the remainder of the century. This is largely due to demographic changes, impact of rising third-party coverage for dental services, and expected economic growth contained in the assumptions of the Congressional*

Budget Office (CBO) and of Social Security Administration's Board of Trustees for the Old-Age, Survivors and Disability Insurance Program, in combination with the anticipated tightening of dentist supply in the last decade of this century.

- *Although total real expenditures are expected to continue to show growth, rate of growth is expected to be below that which occurred between 1975-1985 (see table VII-4).*

Auxiliaries

Three basic dental auxiliary categories make up the dental team - dental hygienist, dental assistant, and dental laboratory technician. Dental hygienists are licensed by the States. The dental assistant and dental laboratory technician may either be trained on the job or be a graduate of an accredited program and certified by the Commission on Dental Accreditation.

According to the ADA's 1988 Survey of Dental Practice, 96.5 percent of all dentists who owned or shared ownership in a dental practice employed at least some dental auxiliaries on a full or part-time basis, 55.1 percent employed at least one full or part-time dental hygienist, and 91.2 percent employed at least one chairside dental assistant, either on a full or part-time basis (ADA, 1988h). Approximately 10 percent of all dentists employed at least one full or part-time dental laboratory technician.

Many variables will affect future demand for dental auxiliary personnel, but the total number of dentists employing auxiliaries and demand for dental services will be the primary determinants. Although considerable knowledge exits about the dentist pool, much less is known about dental auxiliaries including size of the reserve pool. This makes it difficult to accurately assess any shortage or to predict with accuracy any potential future problems, although an increase in demand for dental auxiliary services during the next decade is expected.

Dental Hygienists

Dental hygienists are licensed direct care providers who serve an important role in delivery of oral health services. While the types of services they provide may vary depending upon needs of individuals or groups as well as state regulations, they do provide educational, clinical, and therapeutic services.

Several government agencies and professional organizations have made estimates for the number of actively practicing dental hygienists. The ADA reported in their 1988 Annual Reports and Resolutions an estimated 26,680 active part-time and 34,300 active full-time dental hygienists for a total of 60,980 active full and part-time dental hygienists practicing in 1986 (ADA, 1988m). A 1988 survey of dental hygiene license holders conducted by the American Dental Hygienists' Association (ADHA) showed approximately 71,540 actively practicing full and part-time dental hygienists (ADHA, 1989). Differences between the 1986 and 1988 estimates can be accounted for, in part, by the methodology used to make the estimates and the two-year lag in dental hygiene graduates.

Dental hygienists spend about 78 percent of the workday providing direct clinical and therapeutic care to patients, primarily in private dental offices (95 percent). Of those practicing in dental offices, 73 percent are employed in solo dental practices and 27 percent are employed in group practices. Approximately 86 percent of dental hygienists work for general dentists while the remainder work for specialists such as periodontists (8.3 percent), prostodontists (.03 percent) and others (1.9 percent). The remaining 5 percent of dental hygienists are employed in settings other than private dental practices. These include state and local governments, public health clinics and hospitals, dental schools, and other settings such as research facilities, business, and industry.

According to a 1986 survey by the ADHA the majority of dental hygienists are women (99.2 percent) (ADHA, 1989). Over 90 percent are under the age of 44; most are married (74.5 percent). The majority of dental hygienists are White (95.4 percent) while Black, Spanish, Asians, or Pacific Islanders together comprise less than 5 percent.

There are 197 accredited dental hygiene education programs. They are primarily located within institutions of higher education including universities, colleges, community colleges, and technical institutions. As shown in table VII-5, 91 percent of programs are in public institutions. Also, there are 39 dental hygiene degree completion education programs located primarily in public institutions. Degree completion programs provide a mechanism for dental hygienists who hold a certificate, diploma, or associate degree to attain a baccalaureate degree in dental hygiene or dental hygiene education.

Table VII-5

Location of Dental Hygiene Entry Level Programs

	University	College	Community College	Technical	Total
Total	72	1	113	11	197
Private	15	1	0	0	16
Public	57	0	113	11	181

There are five graduate dental hygiene education programs that award a master of science degree. These require approximately two years of study and prepare individuals for advanced roles in education, research, and administration.

At present, 14.4 percent of dental hygienists hold a certificate or diploma, 56.9 percent hold an associate degree, 27.5 percent hold a baccalaureate degree, and 1.1 percent hold a master of science degree in dental hygiene.

Dental hygienists have practiced under the supervision of dentists since the discipline of dental hygiene was established approximately 75 years ago. Although the percentage of dental hygienists working outside traditional private practice settings is small, a goal of the profession is to increase access to oral health care for special groups such as the homebound, individuals in nursing homes, and geriatric and day care centers.

Legislation that would either modify supervision requirements for dental hygienists or expand the scope of practice has been submitted for consideration in several states during the past several years. One bill was successful in 1986 when Colorado promulgated legislation to permit dental hygienists to perform certain procedures without supervision and to allow dental hygienists to be sole proprietors of hygiene services practices. In California a legislatively mandated project is being conducted to examine the impact of independent dental hygiene practices. Such State actions make it apparent that the traditional roles and responsibilities of dental hygienists are entering a period of reassessment and change.

Dental Assistants

The chairside dental assistant's primary function is to assist the dentist to treat patients in the dental operatory. However, many chairside dental assistants also provide individual services such as oral hygiene instructions to patients and management services for the dental office. Examples of such management services include arranging and confirming appointments, sending out statements, receiving payments, and ordering supplies.

The estimated number of active dental assistants has shown an upward trend for the past several years. Active dental assistants include both graduates of accredited programs and those trained on-the-job. The Bureau of Health Professions' estimated number of dental assistants active in the workforce in 1988 was 197,000; the ratio of active assistants to active dentists was 134 per 100, nearly double the 1950 ratio (figure VII-5).

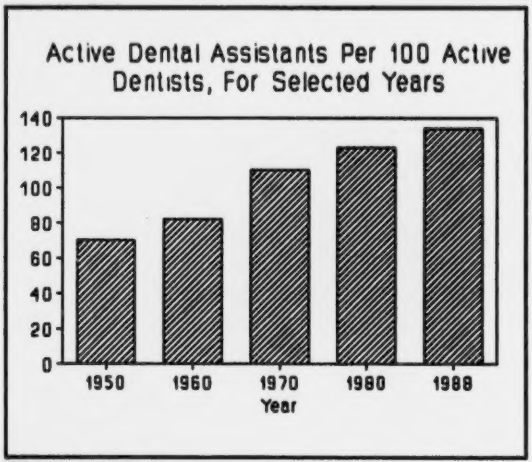

Figure VII-5

The number of dental assistant programs accredited by the Commission on Dental Accreditation declined from 298 in academic year 1978-79 to 275 in academic year 1987-88. First-year enrollments also declined from the 1979 high of 8,386 students to the 1987 level of 6,242, a 26 percent decline. The number of dental assistants graduating from accredited programs declined as well, from 6,105 in academic year 1983- 84 to 4,660 in academic year 1986-87, a 24 percent drop.

Dental Laboratory Technicians

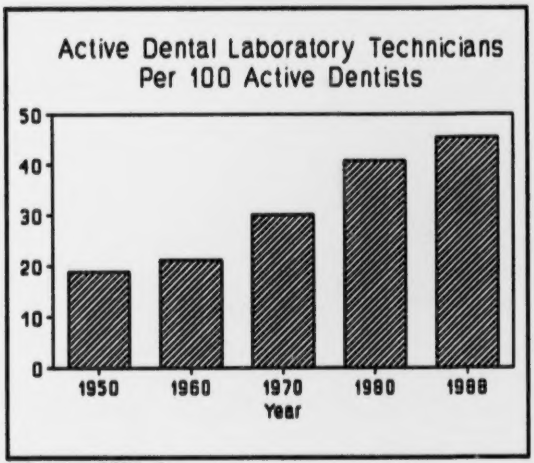

Figure VII-6

The dental laboratory technician is the dentist's primary resource for fabricating dental prosthesis in the laboratory. Their services include, but are not limited to, fabricating complete and partial dentures, crowns, bridges, ceramics, and orthodontic appliances. Most technicians work in commercial laboratories as either employees or owners. The Federal Government employs a small number of dental laboratory technicians. According to the ADA about 6 percent of all dentists reported employing full-time dental laboratory technicians in 1987, and 3.4 percent reported employing part-time dental laboratory technicians. The Bureau of Health Professions' estimated total number of dental technicians was 66,700 for 1988, a ratio of 45.4 technicians per 100 dentists, an increase of approximately 2.5 times since 1950 (figure VII-6).

Although the number of accredited dental laboratory technician training programs decreased by only 3 (from 58 to 55) since 1986, first-year enrollments declined substantially, from 1,665 in academic year 1981-82 to 1,096 in academic year 1987-88, a 34 percent decline. The number of graduates from accredited programs also decreased between academic years 1981-82 and 1986-87, from 1,165 to 802, a 31 percent decline. As with chairside dental assistants many dental laboratory technicians are trained on-the-job.

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Technical Note VII-1

Historically, the model utilized national expenditure data developed by the Division of National Cost Estimates of the Health Care Financing Administration (HCFA). The Department of Commerce recently released a second set of estimates providing a somewhat different picture of dental expenditures. These estimates are part of the Personal Consumption Expenditures component of the National Income and Product Accounts (NIPA). The NIPA and HFCA data sets both purport to provide an accurate picture of national dental expenditures, but the data sets are different.

National Income and Product Accounts estimates are largely based on data from the Bureau of the Census' Annual Survey of Service Industries. On the other hand, HCFA estimates are generated from several separate pieces of information about the dental care sector. The estimates are heavily influenced by Internal Revenue Service tax return data plus the employment and price data from the Bureau of Labor Statistics. Two main differences distinguish the two estimates: first, HCFA data include expenditures for dental care provided by governmental facilities while NIPA data do not and second, HCFA adjusts its estimates based upon dental employment while NIPA does not.

For this report, the NIPA database has been selected as better reflecting national dental expenditures.

Technical Note VII-2

Model Assumptions. The following assumptions were used in the forecasts:

- *The U.S. Bureau of the Census projects that the U.S. civilian population will grow from 244 million in 1988 to 266 million in 2000. However, the annual rate of growth of the population is expected to decline by two-fifths, from 1.0 percent in 1988 to 0.6 percent in 2000.*

- *Each of two separate scenarios assumes an annual rate of growth in real per capita income. Each scenario is composed of a short/medium-term assumption and a long-term assumption. Both scenarios employ the same short/medium-term assumption based on the 1989 economic assumptions of the Congressional Budget Office (CBO), which projects changes in the annual growth of real per capita income from 4.4 percent in 1988 to a short-term forecast level of 2.9 percent in 1989 and a medium-term projection level of 2.3 percent in 1994.*

In addition to the short/medium-term assumption described above, the first scenario includes a long-term consensus assuming a constant 2.3 percent annual growth rate through the end of the century. A second scenario was developed to demonstrate the effect on the forecast of changing the long-term economic growth assumption to one of lower economic growth. This scenario used the same short/medium-term assumption developed by CBO for the years 1989-1994, but employed the Alternative III (more pessimistic) economic assumption developed by the board of trustees of the Old-Age, Survivors and Disability Insurance (OASDI) Program in its 1988 Annual Report for the 1995-2000 long-term projections. OASDI assumes that the annual real per capita income growth rate will fall continuously after 1994 to a level of 1.6 percent in the year 2000.

- *According to the research conducted to reestimate and update the model, the rate of technological progress (i.e., growth in dentists' productivity) has been slowing over the last few years from levels of the 1960s and 1970s. A probable explanation for this trend is that most of the increase in productivity due to high-speed equipment, better use of dental auxiliaries, and product improvements has been realized. Thus, for the purposes of this report it is assumed that productivity will increase at 0.5 percent annually throughout the remainder of the forecast period.*

- *The number of projected dental graduates were endogenously generated by the EMODS model.*

Table VII-A-1. Number of Dental School Applicants in Relation to Number of First-Year Dental Students: Academic Years 1960-61 Through 1988-89

Academic year	Number of applicants	Number of first-year students	Number of applicants per first-year student	Percent of applicants enrolled
1960-61	6,119	3,616	1.7	59
1961-62	5,841	3,605	1.6	62
1962-63	6,566	3,680	1.8	56
1963-64	8,969	3,770	2.4	42
1964-65	9,598	3,836	2.5	40
1965-66	9,988	3,806	2.6	38
1966-67	10,177	3,942	2.6	39
1967-68	10,264	4,200	2.4	41
1968-69	9,037	4,203	2.2	46
1969-70	10,325	4,355	2.4	42
1970-71	10,413	4,565	2.3	44
1971-72	11,012	4,745	2.3	43
1972-73	13,542	5,337	2.5	39
1973-74	14,876	5,445	2.7	37
1974-75	14,970	5,617	2.7	38
1975-76	15,734	5,763	2.7	37
1976-77	14,807	5,935	2.5	40
1977-78	12,835	5,954	2.2	46
1978-79	11,753	6,301	1.9	54
1979-80	10,520	6,132	1.7	58
1980-81	9,601	6,030	1.6	63
1981-82	8,852	5,855	1.5	66
1982-83	7,724	5,498	1.4	71
1983-84	7,128	5,274	1.4	74
1984-85	6,499	5,047	1.3	78
1985-86	6,216	4,843	1.3	78
1986-87	5,724	4,554	1.3	80
1987-88	5,397	4,370	1.3	77
1988-89	5,017	4,196	1.2	84

SOURCE: Data compiled by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, based on data from American Association of Dental Schools. Applicant Analysis, 1988 Entering Class. Also prior reports for 1975 through 1986.

American Dental Association, Council on Dental Education. Analysis of Applicants to Dental School and First-Year Enrollment 1974. Supplement 7 to Annual Report on Dental Education 1974-75. Also prior annual reports.

Table VII-A-2. First-Year Enrollment in Schools of Dentistry in the United States, by Sex: Academic Years 1968-69 Through 1988-89

Academic year	Both sexes	Male	Female
	Number of students		
1968-69	4,203	4,157	46
1969-70	4,355	4,299	56
1970-71	4,565	4,471	94
1971-72	4,745	4,598	147
1972-73	5,337	5,113	224
1973-74	5,445	5,054	391
1974-75	5,617	4,986	631
1975-76	5,763	5,056	707
1976-77	5,935	5,133	802
1977-78	5,954	5,074	880
1978-79	6,301	5,301	1,000
1979-80	6,132	5,056	1,076
1980-81	6,030	4,836	1,194
1981-82	5,855	4,587	1,268
1982-83	5,498	4,275	1,223
1983-84	5,274	3,961	1,313
1984-85	5,047	3,678	1,369
1985-86	4,843	3,519	1,324
1986-87	4,554	3,167	1,387
1987-88	4,370	2,960	1,410
1988-89	4,196	2,801	1,395
	Percent		
1968-69	100.0	98.9	1.1
1969-70	100.0	98.7	1.3
1970-71	100.0	97.9	2.1
1971-72	100.0	96.9	3.1
1972-73	100.0	95.8	4.2
1973-74	100.0	92.8	7.2
1974-75	100.0	88.8	11.2
1975-76	100.0	87.7	12.3
1976-77	100.0	86.5	13.5
1977-78	100.0	85.2	14.8
1978-79	100.0	84.1	15.9
1979-80	100.0	82.5	17.5
1980-81	100.0	80.2	19.8
1981-82	100.0	78.3	21.7
1982-83	100.0	77.8	22.2
1983-84	100.0	75.1	24.9
1984-85	100.0	72.9	27.1
1985-86	100.0	72.7	27.3
1986-87	100.0	69.5	30.5
1987-88	100.0	67.7	32.3
1988-89	100.0	66.7	33.3

SOURCE: American Dental Association, Council on Dental Education. Annual Report on Dental Education, 1980-81 through 1988-89, and Trend Analysis; Supplement to the Annual Report on Dental Education, for 1974-75 and for 1979-80.

Table VII-A-3. GRADUATES OF SCHOOLS OF DENTISTRY IN THE UNITED STATES, BY SEX: ACADEMIC YEARS 1971-72 THROUGH 1987-88

Academic year	Both sexes	Male	Female
	Number of students		
1971-72	3,961	3,921	40
1972-73	4,230	4,166	64
1973-74	4,515	4,423	92
1974-75	4,969	4,813	156
1975-76	5,336	5,088	248
1976-77	5,177	4,808	369
1977-78	5,324	4,684	595
1978-79	5,424	4,790	634
1979-80	5,256	4,541	715
1980-81	5,550	4,725	825
1981-82	5,371	4,533	838
1982-83[1/]	5,687	4,698	989
1983-84	5,337	4,274	1,063
1984-85	5,353	4,213	1,140
1985-86	4,957	3,863	1,094
1986-87	4,717	3,581	1,136
1987-88	4,581	3,318	1,263
	Percent		
1971-72	100.0	99.0	1.0
1972-73	100.0	98.5	1.5
1973-74	100.0	98.0	2.0
1974-75	100.0	96.9	3.1
1975-76	100.0	95.4	4.6
1976-77	100.0	92.9	7.1
1977-78	100.0	88.8	11.2
1978-79	100.0	88.3	11.7
1979-80	100.0	86.4	13.6
1980-81	100.0	85.1	14.9
1981-82	100.0	84.4	15.6
1982-83[1/]	100.0	82.6	17.4
1983-84	100.0	80.1	19.9
1984-85	100.0	78.7	21.3
1985-86	100.0	77.9	22.1
1986-87	100.0	75.9	24.1
1987-88	100.0	72.4	27.6

1/ Excludes 69 graduates not identified by sex.

SOURCE: American Dental Association, Council on Dental Education. Annual Report on Dental Education, 1987-88. Also prior annual reports.

Table VII-A-4. Number of First-Year Dental Students and Number of Dental Graduates, by Sex: Projected for Academic Years 1987-88 Through 2019-20[1]

Academic year	Number of first-year students			Number of graduates		
	Total	Male	Female	Total	Male	Female
1987-88[2]	4,196	2,801	1,395	4,618	3,365	1,253
1988-89	4,096	2,692	1,404	4,431	3,220	1,211
1989-90	3,996	2,586	1,410	4,167	2,898	1,269
1990-91	3,896	2,482	1,414	3,934	2,699	1,235
1991-92	3,796	2,380	1,416	3,862	2,608	1,254
1992-93	3,696	2,281	1,415	3,788	2,516	1,272
1993-94	3,596	2,183	1,413	3,724	2,443	1,281
1994-95	3,496	2,088	1,408	3,660	2,361	1,299
1995-96	3,396	2,028	1,368	3,586	2,278	1,308
1996-97	3,296	1,968	1,328	3,523	2,205	1,318
1997-98	3,196	1,908	1,288	3,459	2,132	1,327
1998-99	3,196	1,908	1,288	3,395	2,059	1,336
1999-2000 through 2019-20	3,196	1,908	1,288	3,321	1,976	1,345

1/ The basic methodology was used for all of these projections. It is assumed that the number of first-year students will continue to decrease during the next 10 years at about two percent annually and then stabilize. It is also assumed that the proportion of female students will continue to increase gradually during the next 10 years at a little more than half the rate of the last 10 years.

2/ First-year students for 1987-88 are actual figures.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table VII-A-5. Number of Active Dentists and Dentist-to-Population Ratios; Selected Years, Estimated 1970-1988, and Projected 1990-2020[1]

Year	All active dentists[1]	Total population (thousands)	Active dentists per 100,000 total population[2]
1988	146,800	247,284	59.4
1990	149,700	250,410	59.8
Low	149,700	250,410	59.8
High	149,700	250,410	59.8
2000	154,600	268,266	57.6
Low	152,400	268,266	56.8
High	159,900	268,266	59.6
2010	151,200	282,575	53.5
Low	145,000	282,575	51.3
High	164,500	282,575	58.2
2020	140,700	294,364	47.8
Low	130,900	294,364	44.4
High	161,400	294,364	54.8

1/ The basic methodology was used for the projections shown for the years 1988 through 2020; alternative assumptions were used for the low and high projections.

2/ Ratios are based on total population, including Armed Forces overseas, as of July 1 for 1990 and succeeding years.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table VII-A-6. Number of Active Dentists by Sex: Estimated 1988, and Projected for Selected Years, 1988-2020[1]

Year	Number of active dentists	Male dentists	Female dentists	Percent female of all dentists
1988	146,800	135,500	11,300	7.7
1990	149,700	136,100	13,600	9.1
2000	154,600	129,900	24,700	16.0
2010	151,200	116,200	34,900	23.1
2020	140,700	98,300	42,400	30.2

1/ The basic methodology was used for all these projections.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table VII-A-7. FORECAST OF ECONOMIC ACTIVITY IN THE DENTAL SECTOR, BASED ON DEPARTMENT OF COMMERCE DATA, 1988-2000 1/ 2/

	Scenario Number One: Higher Economic Growth 3/				Scenario Number Two: Lower Economic Growth 4/			
YEAR	Annual Growth Rate of GNP (%)	Real Price	Real Exp.	Exp./ Dentist	Annual Growth Rate of GNP (%)	Real Price	Real Exp.	Exp./ Dentist
1988	4.4	100	100	100	4.4	100	100	100
1989	2.9	101	104	103	2.9	101	104	103
1990	2.3	102	107	105	2.3	102	107	105
1991	2.2	102	110	106	2.2	102	110	106
1992	2.2	103	113	108	2.2	103	113	108
1993	2.3	103	116	110	2.3	103	116	110
1994	2.3	104	120	113	2.3	104	120	113
1995	2.3	105	124	116	2.1	105	123	116
1996	2.3	106	127	119	1.9	106	126	118
1997	2.3	107	131	123	1.9	106	129	121
1998	2.3	108	136	127	1.8	107	133	124
1999	2.3	109	140	131	1.7	108	136	126
2000	2.3	110	144	135	1.6	108	138	129

1/ Real price, real expenditures, and real expenditures/dentist are presented as indices with the base year 1988 (i.e. 1988=100). "Real" denotes that the figures have been adjusted for inflation by dividing by the overall consumer price index. Dental expenditures in 1988 were $27.111 billion dollars (current $). Real price is defined as the ratio of the dental component of the consumer price index to the overall level of the consumer price index; for the purpose of this report, the real price was standardized at 100.00 in 1988. Forecasted prices were generated by the Bureau's EMODS model, using CBO's and OASI's forecasted percent inflation as noted in 3/ and 4/ below.

2/ Actual expenditure data through 1988 is from the National Income and Product Accounts (NIPA), Department of Commerce. Forecasted expenditures were generated by the Bureau's EMODS model. (For detailed description of the NIPA data, see Technical Note 1 at the end of this chapter.)

3/ For Scenario One, GNP rates are from the Congressional Budget Office's 1989-1990 short-term economic forecast and 1991-1994 medium-term projections. CBO's 1994 projection of 2.3 percent has been extended and kept constant through 2000.

4/ For Scenario Two, GNP figures for 1989-1994 are from the CBO, as noted for Scenario One above. OASI's "pessimistic" projections, based on their Alternative III assumptions, have been used for 1995-2000.

Chapter VIII

NURSING

This is the seventh report to the Congress in response to the statutory requirements in section 951 of P.L. 94-63 as amended in section 12(h), P.L. 95-623. Those requirements direct the Secretary to provide reports on the current and future supply and distribution of and requirements for nursing personnel within the United States and within each State.

The scope of the reporting requirements is very broad, encompassing about 3-4 million individuals, including registered nurses, licensed practical/vocational nurses, and ancillary nursing personnel. In recognition of various levels of practice and responsibilities and the corresponding necessary qualifications, the reporting requirements call for data on supply and distribution of and requirements for registered nurses with advanced training or graduate degrees, including nurse practitioners. Section 951 also requires the gathering of data on the number of nurses working, those practicing full time and part time, type of employment and locations of practice, compensation levels, and annual entrants from other countries. Fulfilling these requirements involves the collection and summarization of data from a variety of sources as well as the development of detailed projections for a number of factors. Finally, reporting requirements call for the Secretary to make recommendations that will aid in achieving an equitable distribution and adequate supply of nurses within the United States and each State.

Focusing on registered nurses, the material in this report builds upon previous reports and presents new data, including findings from the recently completed National Sample Survey of Registered Nurses, March 1988, carried out by the Division of Nursing, Bureau of Health Professions, Health Resources and Services Administration.

Latest comprehensive data available for licensed practical/vocational nurses is from the 1983 National Sample Survey of Licensed Practical/Vocational Nurses (Jones, 1985). Significant changes have occurred in staffing configurations for the delivery of care as well as modes of delivery that have materially affected the use of licensed practical/vocational nurses. These changes could have seriously affected the overall supply and availability of these nurses. Lack of current, complete data precludes development of current and future estimates of the supply and distribution of and requirements for licensed practical/vocational nurses.

Only limited information is available on the characteristics of those who fill ancillary nursing positions (nursing aide, orderly, home health aide). These individuals are mainly on-the-job trained or receive training in relatively short-term educational courses and are, for the most part, not licensed or certified.

Ideally, discussion of characteristics of nursing personnel should at least provide data on the two occupations within nursing that require formal education and licenses to practice: registered nurses and licensed practical/vocational nurses. But there are no recent descriptive data on licensed practical/vocational nurses similar to that on registered nurses. The Current Population Survey, conducted by the Bureau of Census for the Bureau of Labor Statistics, does provide estimates for the licensed practical/vocational nurse population (as well as for registered nurses and nursing aides). The Current Population Survey, however, unlike the sample surveys that collect data from licensed personnel, obtains its data through household surveys in which the household members may belong to one of a variety of occupations. Thus, ambiguous or incomplete responses in the Current Population Survey may result in misclassification of occupations, particularly for closely related occupations such as the three within nursing. These misclassifications could affect the data describing the characteristics of each group.

Also, certain definitional differences exist. For example, studies of nurses classify all those in positions requiring nurses as being in nursing employment so that, for example, nurses who are teachers educating nursing students are considered in nursing employment. The occupational system followed in the Current Population Survey would classify these individuals as teachers, not nurses.

Finally, a review of annual data on the estimates of individuals within each of the nursing occupations from the Current Population Survey shows wide fluctuations from year to year. Since the two licensed occupations require formal education for entry, it would seem unlikely that such fluctuations would occur. Available data from other studies in which the nurse was the subject or in which employers identify the type of employee they have hired demonstrate that such fluctuations are not likely.

The Current Population Survey data are helpful in the general sense of placing the occupations within the perspective of the total occupational distribution of the country's work force. However, given the limitations identified above, the data would not be appropriate to include in a discussion requiring a more precise characterization of the occupational group.

Current Developments in Nursing Education

Registered nurses and practical/vocational nurses are prepared in formal educational programs. The programs for registered nurses include both entry into nursing and advanced or post-RN levels. Entry level programs for both registered and practical nurses are reviewed and approved for the preparation of individuals by each of the State Boards of Nursing to take the licensure examination. For many years the National League for

Nursing has carried out annual studies of entry programs for both types of nurses and the post-RN programs (NLN, various years). Data from these studies provide the basis for an analysis of trends in numbers of programs and their student bodies.

Basic Nursing Education to Prepare for Registered Nurse Licensure

Programs, Students and Graduates. Preparation to become a registered nurse may be obtained in various settings. The programs in each setting vary in length and provide different credentials upon completion. All graduates, however, take the same licensing examination, which measures "minimum safe practice," and all are licensed as registered nurses. As of October 1988 there were 1,443 basic nursing education programs preparing for registered nurse licensure. This number has decreased from 1,477 in 1984, the highest level in recent years, mainly due to a decline in the number of diploma programs. These programs, primarily 3 years in length and located in hospitals, were, until the 1970s, the major preparers for registered nurse licensure. Since that time, their number has steadily decreased to 171, only 12 percent of all programs.

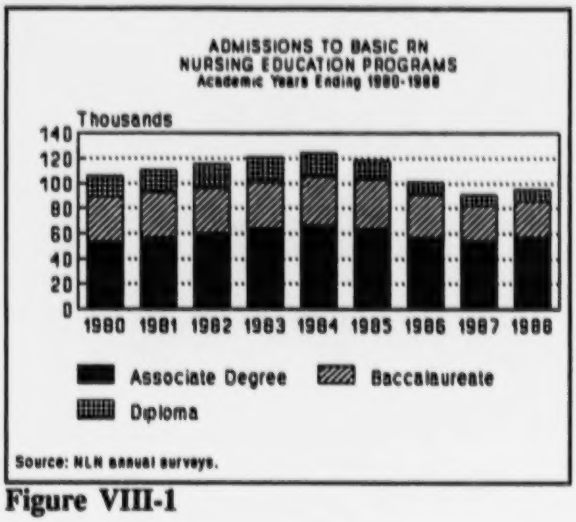
Associate degree programs, usually 2 years in length and located in community colleges, were first established in the early 1950s. Fifty-five percent, or 792, of the programs in October 1988 were associate degree programs, an increase of 16 since October 1984.

The number of baccalaureate programs has increased. In 1988 they numbered 480 compared with 427 in October 1984. Baccalaureate programs are most often in colleges or universities and require at least 4 years of academic preparation. The length of the program varies according to which year students are admitted -- freshman, sophomore, or junior year. In recent years there has been a shift to admission at the sophomore or junior year. Included in the count of baccalaureate programs are six master's degree and two doctoral programs that provide initial preparation for licensure as a registered nurse.

Recent concerns about a shortage of registered nurses have centered in part on the availability of applicants for nursing programs. Since there is no unduplicated list of applicants to nursing programs, the focus has been put on the number of admissions, or first-time enrollments. The number of admissions had declined from its peak of 123,824 in the 1983-84 academic year to 90,693 in the 1986-87 academic year (figure VIII-1). However, in the 1987-88 academic year, admissions to nursing education programs rose 4.3 percent, to 94,594. Although all three types of programs showed some increase, associate degree programs had the largest increase with 5.7 percent more admissions than in 1986-87.

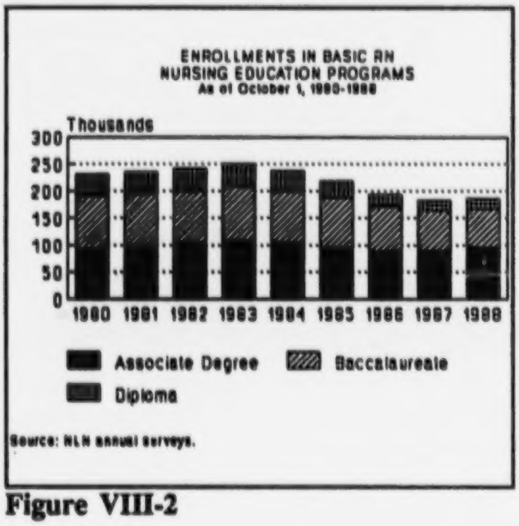
Along with the increase in admissions to programs preparing for registered nurse licensure, there is an increase in total enrollments (figure VIII-2). As of October 1988 enrollments numbered 185,962, compared with 182,947 for 1987. This increase, however, is due to the larger number of students in associate degree programs, which rose from 90,399 in 1987 to

96,387 in 1988. Total enrollments in the other two types of programs continue to reflect the decreases in admissions of earlier years. Similarly, the graduation totals for the 1987-88 academic year, in line with the sizeable 3-year decrease in admissions registered before 1987-88, declined 8 percent (figure VIII-3). Data on admissions and graduates in each state for academic year 1987-88 are shown in table VIII-A-1.



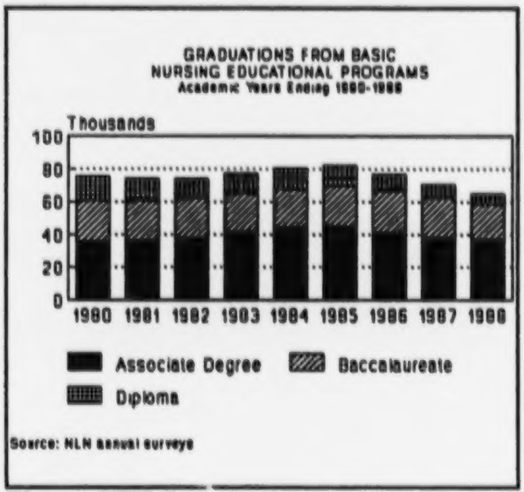
Source: NLN annual surveys.

Figure VIII-1



Source: NLN annual surveys.

Figure VIII-2



Source: NLN annual surveys

Figure VIII-3

Student Characteristics in Basic RN Programs. According to the latest available data from the National League for Nursing in mid-1989, about 7 percent of admissions to basic RN programs in the 1986-87 academic year are men. Almost 17 percent of admissions in 1986-87 were from racial/ethnic minority backgrounds. Most of these (10.9 percent of total admissions) were Black, non-Hispanic. Associate degree programs are most likely to have men and racial/ethnic minorities among their admissions while the diploma programs are least likely to have such admissions.

Among the three types of basic nursing education programs, the associate degree programs, with about 18 percent of their admissions from racial/ethnic minority groups, were the most likely to have such admissions. Diplomas programs, with 13 percent of their admissions from racial/ethnic minority groups, were the least likely. Associate degree programs were also most likely to have men enrollees (7.6 percent of the 1986-87 admissions) and the diploma programs, the least likely (5.9 percent of their admissions).

Costs to the Students. For the 1987-88 academic year, the National League for Nursing reported that the average annual tuition in a publicly supported basic program was $1,388 for students who were residents of the State and/or county in which the school was located. In privately supported schools, the average was $4,738. These costs exclude laboratory and similar fees.

Average tuition costs in both publicly and privately supported schools have increased since the 1985-86 academic year, perhaps partly due to newly instituted fees. The largest increase (65 percent) occurred in the publicly supported associate degree programs, which comprise 88 percent of programs. Privately supported baccalaureate programs, 50 percent of programs, had the highest tuition costs, averaging $6,150 in the 1987-88 academic year.

Limited information on ways students finance their nursing education is available from a survey of 1985-86 college graduates conducted by the National Center for Education Statistics, U.S. Department of Education. As a result of an interagency agreement between the Bureau of Health Professions and the Center, information on graduates of basic baccalaureate nursing programs was obtained from the survey. According to the survey, a relatively large group of those graduates received some type of loan or scholarship financial support. About 73 percent of the estimated 18,075 graduates applied for some type of financial aid, Federal, State and/or other governmental or private, and most applicants (84 percent) were awarded aid. Average amount borrowed by students was $8,988, with an average of $6,115 still owed after graduation.

A recently published study by the American Association of Colleges of Nursing, with funding from the Pew Charitable Trusts, found that the average total indebtedness for generic baccalaureate students is $12,939 in private institutions and $10,056 in public institutions, based on data from case studies in 10 colleges and universities (AACN, 1989). The study reported that the average total cost for the generic baccalaureate student, including foregone earnings, is $115,279 in private colleges and $95,794 in public institutions. The net income foregone is estimated at $76,456.

Post-RN Academic Nursing Education

Graduate programs provide nurses the important preparation for leadership positions. As researchers, administrators, teachers, and expert clinicians, these people provide the management structure and guidance to assure the sound practice of nursing in all the health care system. In addition to advanced nursing education programs, individuals already licensed as a registered nurse may also seek baccalaureate nursing education if their initial education was in an associate degree or diploma program.

Post-RN Baccalaureate Programs. As of October 1987, there were 46,375 registered nurses enrolled in baccalaureate programs. The majority (57 percent) attended the same programs in which students receiving their initial nursing education were enrolled and were mainly full-time students. However forty-three percent were enrolled in the 196 baccalaureate programs specifically designed for the post-RN student and only 26 percent of these were full-time students.

In the 1986-87 academic year, there were 10,714 post-RN graduates from baccalaureate programs. Fifty-eight percent had previously earned associate degrees and 42 percent were graduates of diploma programs. Both enrollments (19 percent) and graduations (20 percent) among post-RN students have increased since 1983.

Master's Degree Programs. According to the latest data from the National League for Nursing, there were 194 master's degree programs in 1987, an increase of 5 programs over the previous year and 40 since 1983. As of October 1987, there were 21,195 registered nurses enrolled in nursing master's degree programs, increases of 6 percent over the prior year and 17 percent since 1983. Although through the late 1970s a majority of master's degree students were full time, in 1987, 71 percent were part-timers. Graduations from master's degree programs in 1986-87 totaled 6,029, a 15-percent increase in a year.

Doctoral Programs. Nursing doctoral students numbered 2,133 in 45 programs on October 1987. Between 1983 and 1987, 18 new programs were established and enrollments increased almost 43 percent. The proportion of students attending school in 1987 on a full-time basis (48 percent) has also increased substantially from 1986 (40 percent). A total of 257 registered nurses received doctorates in the 1986-87 academic year.

Other Programs Providing Advanced Nursing Skills. A number of programs grant certificates for advanced studies in addition to programs offering master's or doctoral degrees. Although a complete listing is not available, data collated by the Division of Nursing in 1989, show that 28 of 113 schools with nurse practitioner or nurse midwifery programs award certificates. Among the 113 are 25 schools that offer nurse midwifery programs 8 award certificates. Programs in the remaining schools confer master's degrees upon completion.

A number of nurse anesthetists programs also present certificates. Of the 94 programs listed by the Council on Accreditation of Nurse Anesthesia Educational Programs in June 1988, 31 are certificate programs. Nine offer a bachelor's degree or confer one upon completion on an optional basis. As was the case for the nurse practitioner and nurse midwifery programs, however, the majority (54) are master's degree programs or provide a master's degree at completion on an optional basis.

Costs of Educating Nursing Students

The costs to institutions for educating nursing students are not easily obtained. Because nursing programs are not usually located in free standing entities, some expense components are commingled with those of other programs operated by the schools.

One aspect of the cost of operating an educational program that has been studied recently, however, is that of the cost to hospitals of providing clinical experiences for students. In response to requirements in the Consolidated Omnibus Reconciliation Act of 1985 (Section 9202(c)(1) of P.L. 99-272), the Bureau of Health Professions studied hospitals receiving reimbursement under Medicare for nursing and other nonphysician health professions educational programs. The report of the study, issued in March 1988, noted that $533 million was reported for nursing education costs from October 1984 to September 1986. (DHHS, 1988a). Although the study design did not require a complete accounting of all programs receiving reimbursement, the report noted that hospitals were receiving reimbursement for nursing educational costs for all types of programs, those they directly operated and those for which they served as a clinical site for programs operated by others at the basic or graduate level. The study investigated fiscal and administrative relationships between the school operating the program and the hospital, the cost incurred by the hospital, and the financial and nonfinancial benefits to the hospital from the program. The most important benefit cited by most hospitals was ability to recruit staff. The recent study by the American Association of Colleges of Nursing confirmed this finding (AACN, 1989).

Further activity in this area will be carried out as a result of the requirements in Section 8411(a) of the Technical and Miscellaneous Revenue Act of 1988 (P.L. 100-647). The Division of Nursing, BHPr, in cooperation with the Health Care Financing Administration, is conducting demonstrations designed to allow a hospital to be reimbursed for reasonable costs incurred for activities in connection with a clinical component of an approved educational program leading to a master's or doctoral degree in nursing.

Programs Preparing Practical Nurses

Practical nursing programs are generally 12 months in length. While the majority are located in adult vocational educational settings, a sizeable proportion are in community colleges. The 1,035 programs in 1987 were substantially fewer than the number in 1984, 1,254. There also has been a significant decrease in the number of graduates: 27,285 in the 1986-87 academic year compared with 44,654 in 1983-84. Table VIII-A-2 provides data on admissions and graduations in each state in 1986-87.

Current Developments in the Registered Nurse Population

The Registered Nurse Supply

As of March 1988 there were an estimated 2,033,032 individuals in the United States with current licenses to practice as registered nurses, according to the fourth National Sample Survey of Registered Nurses (DHHS, 1990). An estimated 1,627,035 were employed in nursing (80 percent), the majority, on a full-time basis (table VIII-1).

Table VIII-1

DISTRIBUTION OF REGISTERED NURSE POPULATION
BY EMPLOYMENT STATUS, MARCH 1988

	ESTIMATED NUMBER	PERCENT
TOTAL WITH LICENSES TO PRACTICE	2,033,032	100.0
EMPLOYED IN NURSING	1,627,035	80.0
EMPLOYED FULL-TIME	1,099,576	54.1
EMPLOYED PART-TIME	526,489	25.9
EMPLOYED IN OTHER OCCUPATIONS	114,064	5.6
HEALTH-RELATED OCCUPATION	50,144	2.5
NON-HEALTH-RELATED OCCUPATION	62,549	3.1
TYPE OF EMPLOYMENT NOT KNOWN	1,371	0.1
NOT EMPLOYED	291,933	14.4

Both total RN population and number employed in nursing are increases over the numbers found in prior national sample surveys. The registered nurse population is 45 percent larger in the 1988 survey than in the first study (September 1977) and about 8 percent larger than in the November 1984 study. The number of employed nurses increased at an even greater rate than the overall registered nurse population. Thus, along with increases in the number of nurses, increases occurred over the years in the proportion who were employed in nursing (table VIII-2).

Table VIII-2

EMPLOYMENT RATE OF REGISTERED NURSE POPULATION, 1977-1988

	TOTAL RNs		EMPLOYED IN NURSING			NOT EMPLOYED IN NURSING
DATE	EST. NUMBER	PERCENT	TOTAL PCT.	FULL-TIME PCT.	PART-TIME PCT.	PCT.
SEPT. 1977	1,401,633	100.0	69.8	47.5	22.2	30.2
NOV. 1980	1,662,382	100.0	76.6	51.4	24.4	23.4
NOV. 1984	1,887,697	100.0	78.7	52.1	26.6	21.3
MARCH 1988	2,033,032	100.0	80.0	54.1	25.9	20.0

Nurse Immigrants

Although most additions to the registered nurse population come from United States programs, a small proportion are graduates of schools in other countries. About 73,000, or less than 4 percent of the 2 million registered nurses were from such schools (1988 survey).

Not all nurses who immigrate obtain a license to practice here. To gain licensure, they must pass licensing examinations in each State. According to the latest data published by the National Council of State Boards of Nursing, in July 1987, 41 percent of foreign-educated nurses passed the examination the first time they took it, compared with 91 percent of graduates of U.S. schools (NCSBN, 1989). Foreign nurses retaking the examination also did less well than U.S. graduates, 16 percent passing compared with 48 percent.

A total count of nurse immigrants is not available because occupational background data are not always given when individuals enter the country. However, the Immigration and Naturalization Service (INS) identified 4,063 nurses who immigrated in 1988, about the same as in previous years. The majority are from Asia.

In addition to those who enter the country on a permanent immigration visa, a number of individuals enter as temporary workers on H-1 visas. According to INS, when adjustments are made for occupational underreporting and for those departing the country during their entry year, the estimated number of nurses who entered on H-1 visas in Fiscal Year 1988 was 9,151. This number is considerably higher than that for each of the 3 preceding fiscal years. Almost three-quarters of those entering on H-1 visas since FY 1985 are from the Philippines.

Characteristics of Registered Nurses

Table VIII-3

DISTRIBUTION OF REGISTERED NURSE POPULATION BY RACIAL/ETHNIC BACKGROUND AND EMPLOYMENT STATUS, MARCH 1988

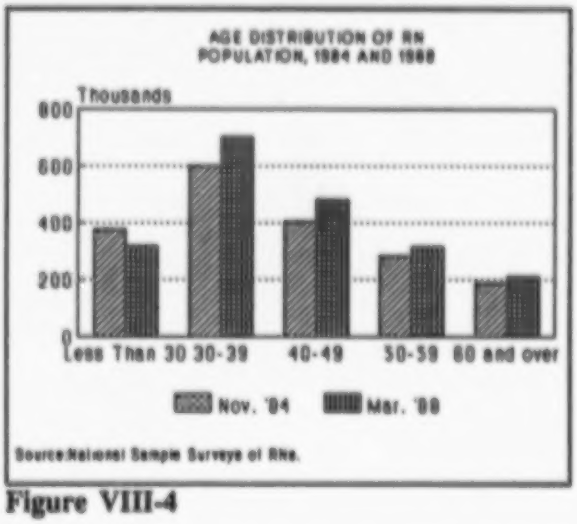
	TOTAL		RNs EMPLOYED IN NURSING		RNs NOT EMPLOYED IN NURSING	
	EST. NUMBER	PERCENT	EST. NUMBER	PERCENT	EST. NUMBER	PERCENT
TOTAL RN POPULATION	2,033,032	100.0	1,627,035	100.0	405,997	100.0
WHITE (NON-HISPANIC)	1,864,157	91.7	1,479,093	90.9	385,063	94.8
BLACK (NON-HISPANIC)	73,647	3.6	65,304	4.0	8,343	2.1
ASIAN/PACIFIC ISLANDER	46,691	2.3	44,210	2.7	2,481	0.6
AMERICAN INDIAN/ALASKAN NATIVE	8,358	0.4	7,129	0.4	1,229	0.3
HISPANIC	26,163	1.3	22,140	1.4	4,023	1.0
NOT KNOWN	14,016	0.7	9,159	0.6	4,857	1.2

Racial/ethnic minority background. Despite the increase in the number of registered nurses between the 1984 and 1988 studies, there was little change in the number from racial/ethnic minority backgrounds, and estimated 155,000 in both years. Almost half were Black (table VIII-3). Minority nurses are more likely to be employed in nursing. In March 1988, 8.5 percent of the 1.6 million employed registered nurses were from racial/ethnic, minority backgrounds.

Age Distribution. The median age (39 years) of the registered nurse population in March 1988 was unchanged from November 1984, although, the age distributions were different (figure VIII-4). For example, in March 1988, less than 16 percent of nurses were under 30, but in November 1984 about 20 percent were in that age group.

Changes in age levels of the registered nurse population could be related to a number of factors that could materially influence availability of registered nurses in the future. One particular change, seen in sample survey data, is the older age at which individuals are graduating from basic nursing education programs and entering the registered nurse population. Graduates within the past 5 years had a median age at graduation of 25 in contrast to a median age of 23 for graduates of 5 to 10 years ago. This increase in the age at graduation is even greater for associate degree graduates, who are typically older than graduates from diploma and baccalaureate programs. The median age for recent associate degree graduates is 30 in 1988 in contrast to a median of 27 years for graduates of 5 to 10 years ago.

The median age of employed nurses in March 1988 was 38. Almost 40 percent were under 35 years of age. In contrast, the median age of those not employed in nursing was 51, and about one-third were 60 years of age or over.



Source:National Sample Surveys of RNs.

Figure VIII-4

Educational Background of Registered Nurses. During the last decade, major changes have taken place in the educational background of the U.S. registered nurse population. The 1988 sample survey estimated that less than half the nurses had received basic nursing education in a diploma program compared to 75 percent in 1977. Conversely, as can be seen in table VIII-4, only 11 percent of nurses in 1977 were prepared in associate degree programs in comparison with 28 percent in 1988.

It is expected, that these trends will continue as diploma program graduates will be increasingly a smaller proportion of the total registered nurse population and associate degree graduates, an increasingly higher proportion. Among the registered nurse population in March 1988 who had graduated from initial nursing education programs within the last 5

Table VIII-4

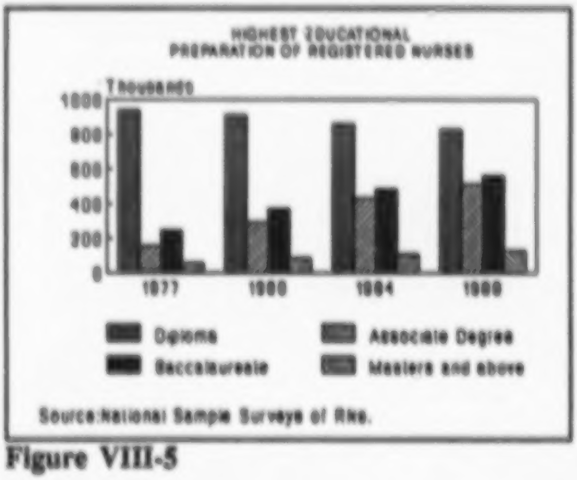
DISTRIBUTION OF REGISTERED NURSE POPULATION BY TYPE OF
BASIC NURSING EDUCATION, 1977-1988

	1977		1980		1984		1988	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
TOTAL	1,401,633	100.0	1,662,382	100.0	1,887,697	100.0	2,033,032	100.0
DIPLOMA	1,049,002	74.8	1,050,661	63.2	1,020,916	54.1	989,941	48.7
ASSOCIATE DEGREE	158,530	11.3	308,616	18.6	466,969	24.7	576,167	28.3
BACCALAUREATE	191,494	13.6	287,993	17.3	384,989	20.4	451,985	22.2
MASTER'S & ABOVE	(NOT AVAILABLE)		1,593	0.1	2,705	0.1	1,918	0.1
NOT KNOWN	2,607	0.2	13,520	0.8	12,116	0.6	13,021	0.6

years, 15 percent were from diploma programs and 53 percent from associate degree programs. Among those who had graduated 5 to 10 years earlier, 21 percent were from diploma programs and 46 percent from associate degree programs. About 32 percent of the newer registered nurses and 34 percent of those graduating 5 to 10 years ago were graduates of basic baccalaureate programs.

In addition to basic nursing education, many nurses obtain additional education, either in formal academic degree-granting programs providing preparation for advanced clinical, administrative, or teaching positions, or in continuing education programs providing specialized skills and techniques. About 18 percent, or 374,000, of registered nurses in March 1988, had earned additional degrees since completing their initial nursing education.

Taking all nursing-related education into account, both the initial or basic education and the additional degrees earned since, as of March 1988 about 821,000 registered nurses have diplomas as their highest nursing education, 512,000 have associate degrees, and 557,000, baccalaureate degrees. About 125,000 have nursing or nursing-related master's degrees and 5,400, doctorates. The changing educational distribution can be seen in figure VIII-5.



Source:National Sample Surveys of RNs.

Figure VIII-5

Advanced Education. The shift in the focus of the specialty area of study for those with advanced education at the master's or doctoral levels, seen in the prior sample surveys, continues in the 1988 study. Clinical practice is now the predominant area with 50.7 percent (65,400) of nurses with master's or doctoral degrees estimated to have this specialty. A little less than one-third specialized in some part of the clinical practice area in 1977 as compared with about 46 percent in 1984. While the predominant areas of concentration within clinical practice are still medical/surgical nursing, psychiatric/mental health, and maternal/child health, the number of nurses who specialize in geriatric/gerontology is estimated to have grown from 1,068 in 1984 to 3,529 in 1988.

Table VIII-5

REGISTERED NURSES WITH ADVANCED EDUCATION AT THE MASTER'S OR DOCTORAL LEVEL BY PRIMARY FOCUS OF DEGREE, MARCH 1988

			HIGHEST EDUCATION			
	TOTAL		MASTER'S		DOCTORATE	
PRIMARY FOCUS	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
TOTAL	128,939	100.0	123,637	100.0	5,302	100.0
EDUCATION	32,168	24.9	29,952	24.2	2,216	41.8
SUPERVISION/ ADMINISTRATION	25,402	19.7	25,121	20.3	281	5.3
CLINICAL PRACTICE	65,378	50.7	64,483	52.2	896	16.9
COMMUNITY/PUBLIC HEALTH	9,088	7.0	8,854	7.2	234	4.4
MATERNAL/CHILD	12,231	9.5	12,147	9.8	84	1.6
MIDWIFERY	1,531	1.2	1,531	1.2	0	0.0
GERIATRIC/GERONTOLOGY	3,529	2.7	3,482	2.8	47	0.9
MEDICAL/SURGICAL	19,340	15.0	19,340	15.6	0	0.0
PSYCHIATRIC/MENTAL HEALTH	13,497	10.5	13,046	10.6	452	8.5
OTHER CLINICAL PRACTICE	6,031	4.7	5,952	4.8	79	1.5
SPECIALTY UNKNOWN	131	0.1	131	0.1	0	0.0
RESEARCH	1,279	1.0	185	0.1	1,094	20.6
OTHER	3,929	3.0	3,144	2.5	785	14.8
NOT KNOWN	784	0.6	755	0.6	29	0.5

Those whose degrees are primarily focused on clinical practice or in administration or supervision are most likely to have a master's degree as their highest nursing or nursing-related preparation (table VIII-5). Among the 32,200 nurses with a specialty in education in 1988, about 7 percent had doctorates. Most of the 1,300 nurses whose specialty was research had doctoral degrees.

Nurse practitioners receive their advanced education in either a certificate program or master's degree program. Based on the responses to the 1988 sample survey, it is estimated that 63,000 registered nurses have had preparation as nurse practitioners. This includes about 19,000 with nurse midwifery preparation. About 77 percent received this preparation in certificate rather than master's degree programs. The course of study was fewer than 9 months for 25 percent of those with certificate program preparation; however, today's programs require a minimum of 9 months full-time study.

Geographic Distribution of Registered Nurses

California, with an estimated 192,000 registered nurses, and New York, with an estimated 179,000 nurses had the highest number of registered nurses in 1988. Pennsylvania, Illinois, Florida, and Texas each had over 100,000 nurses. These six States had 40 percent of the 2 million registered nurses in the country. Wyoming and Alaska, had the fewest nurses, 3,000 and 4,200, respectively (See table VIII-3).

In addition to variation in numbers there is variation in the proportion of total nurses employed in nursing. As seen in table VIII-6, nurses in the West North Central and the East South Central parts of the country are most likely to be employed in nursing.

Table VIII-6

PERCENT DISTRIBUTION OF REGISTERED NURSE POPULATION
BY REGION AND EMPLOYMENT STATUS, MARCH 1988

REGION	TOTAL RNs	EMPLOYED IN NURSING TOTAL	FULL-TIME	PART-TIME	NOT EMPLOYED IN NURSING
UNITED STATES	100.0	80.0	54.1	25.9	20.0
NEW ENGLAND	100.0	77.0	43.5	33.5	23.0
MIDDLE ATLANTIC	100.0	76.6	52.6	24.0	23.4
SOUTH ATLANTIC	100.0	78.7	57.4	21.3	21.3
EAST SOUTH CENTRAL	100.0	84.4	65.9	18.5	15.6
WEST SOUTH CENTRAL	100.0	79.5	64.2	15.3	20.5
EAST NORTH CENTRAL	100.0	80.7	51.6	29.1	19.3
WEST NORTH CENTRAL	100.0	84.9	54.4	30.5	15.1
MOUNTAIN	100.0	81.0	54.8	26.2	19.0
PACIFIC	100.0	83.0	51.5	31.5	17.0

Nurses in the West and East South Central regions are most likely to work on a full-time basis when employed in nursing (table VIII-6). While the New England area is among those with lower employment rates, nurses are more likely to work part-time when employed in nursing.

Because of large differences in size of State population, the ratio of nurses to population is a useful way of examining the geographic distribution of nurses. Although these ratios are used for comparison purposes, they are not a true measure of nursing services provided to the population. Concentration of nurses in a particular area is dependent in part on concentration of facilities or organized nursing services in which they can practice. Therefore, true measures of services provided should take into account available facilities as well as nurses (figure VIII-6). As of March 1988, the number of employed nurses in each State varied widely, from 441 per 100,000 population in Louisiana to 1,166 in Massachusetts and 1,653 in the District of Columbia. The nurse/population ratios tend to be highest in the Northeast and lowest in the South. The national average was 668 employed registered nurses per 100,000 population in 1988.

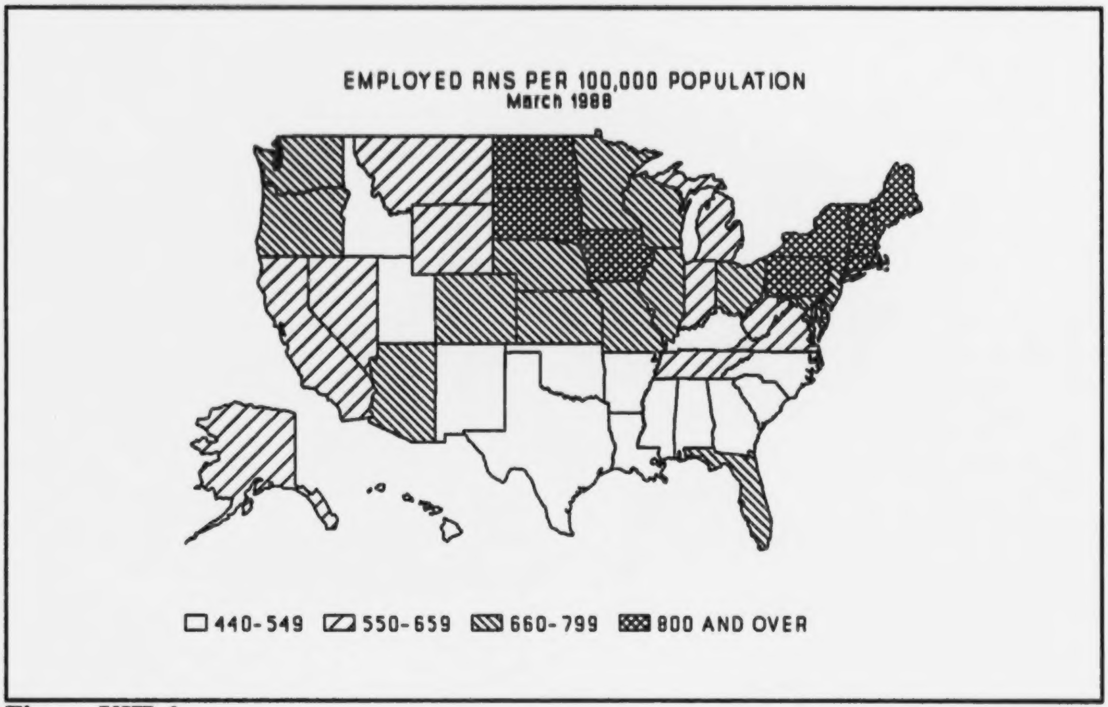

EMPLOYED RNS PER 100,000 POPULATION
March 1988
□ 440-549
▨ 550-659
▨ 660-799
▩ 800 AND OVER

Figure VIII-6

While all States have shown increases in numbers of nurses employed, the relative size of increases from 1977 to 1988 varies widely. In general, there is less growth in the northeastern region than in other regions. States in the South show the highest growth rates.

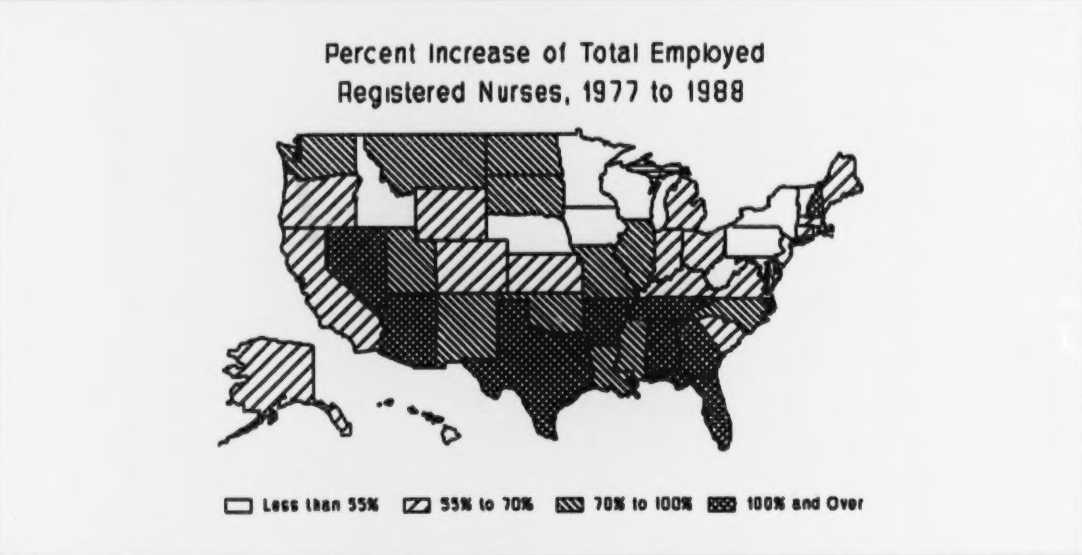

Percent Increase of Total Employed
Registered Nurses, 1977 to 1988
Less than 55%
55% to 70%
70% to 100%
100% and Over

Figure VIII-7

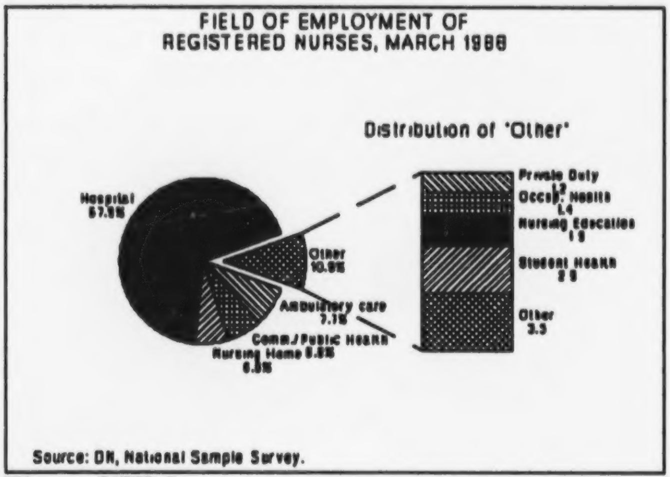
As would be expected, most registered nurses are located in metropolitan areas. In 1988 as in 1984, 18 percent were in nonmetropolitan areas. Nurses in metropolitan areas were somewhat more likely to be employed in nursing than those in nonmetropolitan areas. About 282,000 out of the 1.6 million employed nurses work in nonmetropolitan areas.

Distribution of Nursing Personnel Within the Health Care System

Nursing personnel are the largest group within the health care system. Among the three types of personnel incorporated within the broad category of nursing, registered nurses are the largest group. Registered nurses serve in leadership roles, providing administration, supervision, and teaching, as well as direct patient care throughout the health care system. Licensed practical/vocational nurses provide direct patient care under supervision. Ancillary nursing personnel work as assistants to nurses.

Nursing personnel are found in all areas of health care, although they are predominantly institutionally based. About 68 percent of the 1.6 million employed registered nurses worked in hospitals according to the 1988 sample survey (figure VIII-8). Although there are no recent data on licensed practical/vocational nurses that provide an overall perspective on their distribution within the various employment settings, they work primarily in institutional settings as do most ancillary personnel. As home health services grow, larger numbers will work in that area.

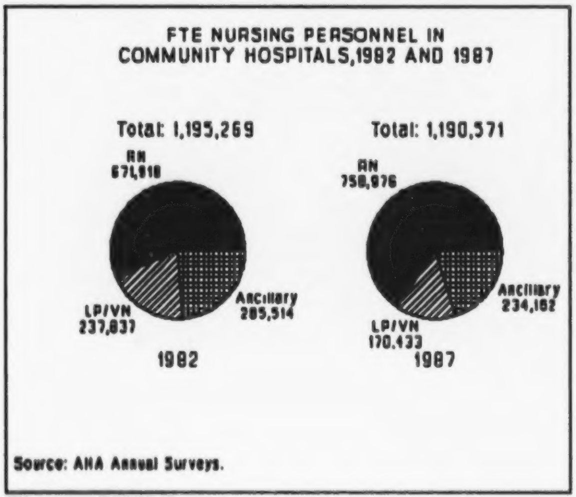
Employment Settings


FIELD OF EMPLOYMENT OF REGISTERED NURSES, MARCH 1988

Source: DN, National Sample Survey.

Figure VIII-8

Hospitals. Although the number of hospitals and their patient populations decreased between 1982 and 1987, the number of registered nurses employed in these facilities increased as the skill level of nursing personnel increased (figure VIII-9). According to data from the American Hospital Association's annual survey of hospitals, the total number of employed nursing personnel decreased 7 percent between 1982 and 1987, while the number of employed registered nurses increased 3 percent. The largest change occurred for licensed practical/vocational nurses, whose number decreased 25 percent in the past 5 years.


FTE NURSING PERSONNEL IN COMMUNITY HOSPITALS,1982 AND 1987

Source: AHA Annual Surveys.

Figure VIII-9

Community hospitals (non-Federal short-term, general and special) employ most of the personnel in hospitals. The data in figure VIII-9 on full-time equivalent (FTE) nursing personnel illustrate the dramatic change in the mix of nursing personnel in these hospitals. The ratio of FTE registered nurses per 100 adjusted patient census rose from 77 in 1982 to 98 in 1987. It is important to note, however, that these ratios include all registered nurses in the hospital, those in supervisory and administrative positions as well as staff level nurses on all shifts. They do not solely represent direct patient care.

Despite increases in the number of registered nurses employed, hospitals report serious shortages of this group. The American Hospital Association's Division of Nursing found a mean vacancy rate of 11.31 percent in a survey of hospitals in December 1987 (AHA, 1987b). It also found that over 60 percent of hospitals were using overtime of registered nurses on a weekly basis to help meet staffing needs. Preliminary data from the AHA's 1988 nursing personnel surveys showed a slight decline in the vacancy rate to 10.6 percent in December (AHA, 1989). However, in another study carried out by the AHA in 1988, hospitals reported that the most serious personnel shortage was among registered nurses.

Recognizing that the reported nursing shortage appeared to be based on increased demand for registered nurses rather than a decrease in available supply, a number of studies were made in hospitals to attempt to explain what might be causing the "nursing shortage." A study by the National Center for Health Services Research and Health Care Technology Assessment, made at the request of the Secretary's Commission on Nursing, related location and hospital structure, nursing salaries and staff mix, and casemix and financial aspects to measures of shortage, including hospital perceived shortages, budgeted vacancy rates and RN-to-patient ratios (DHHS, 1988c). The study found little to explain differences between hospitals with high or low vacancy rates.

The Division of Nursing also reviewed data on the utilization of services from the American Hospital Association's nursing studies to analyze changes occurring in community hospitals between 1982 and 1986 in nursing and nonnursing health professional personnel in an attempt to explain variations in shortages among hospitals. Again, none were found.

A third study was undertaken by Project Hope for the Health Care Financing Administration in response to the Department's interest in investigating the relationship between the Medicare Prospective Payment System (PPS) and the nursing shortage (Project Hope, 1989). That study, which used the hospital as the unit of analysis, was limited to hospitals within the Standard Metropolitan Statistical Areas for which wage data on nursing personnel was available from Bureau of Labor Statistics' studies in 1981 and 1985. The dependent variables were nursing FTEs per beds, adjusted patient days and admissions. Explanatory variables encompassed nurse wages, hospital characteristics, market area characteristics, and time. The dates reflected pre- and post-PPS periods. The conclusion was that PPS is not the sole or predominant cause of increased demand for registered nurses.

The study concluded that registered nurse wages have a significant effect on hospitals' use of RNs, but also found that licensed practical nurse and aide wages rose at the same rate as RN wages so that the relative wage structure did not change appreciably during the period. The study further concluded that increased casemix complexity contributed to the increased hospital demand for registered nurses, although it was not responsible for all increased utilization. The previously mentioned NCSHR study found that although diagnostic casemix severity increased for all hospitals, it was not related to shortages.

None of these studies could draw conclusions outlining definitively the reasons for a demand for registered nurses that exceeded supply. All three studies suggest that factors that might be stronger determinants were not adequately measured. The limitations in the data available, noted in each of the studies, might be significant in identification of these factors. And, more intensive study of the influences appear to be warranted.

Nursing Homes and Extended Care Facilities. Unlike hospitals where the registered nurse is the most common type of nursing personnel, ancillary nursing personnel predominate in nursing homes and extended care facilities. Although the latest information on the distribution of personnel in nursing homes is from the 1985 National Nursing Home Survey conducted by the National Center for Health Statistics, it is probable that ancillary nursing personnel are still the dominant type of nursing personnel. In 1985 it was estimated that there were 704,300 full-time-equivalent nursing personnel employed in nursing homes, 71 percent of whom were nursing aides or orderlies; 17 percent, licensed practical/vocational nurses, and 12 percent, registered nurses (DHHS, 1989).

Data from the 1988 sample survey support the conclusion that there has been little change in the employment of registered nurses in these facilities. The estimated number of registered nurses employed in nursing homes and related care facilities actually declined between the November 1984 and March 1988 surveys, from 115,100 to 107,800. Because a large proportion of registered nurses in nursing homes work part time, on a full-time equivalent basis, the counts were 91,600 and 88,500, respectively. Nursing homes, however, may have been able to increase their skilled nursing personnel through increased employment of licensed practical nurses because of the substantial decrease in employment of practical nurses in hospitals, making them more available for employment elsewhere.

The composition of the nursing staff available to care for residents of nursing homes has been a subject of concern. In the Institute of Medicine study, Increasing the Quality of Care in Nursing Homes it was pointed out that to provide high quality care to residents, assessment and care planning is required, both taking professional skill and judgment (IOM, 1986). In the Omnibus Budget Reconciliation Act of 1987, Congress stipulated requirements for staff coverage in nursing homes by registered nurses. These staffing levels would place requirements for the employment of registered nurses above the level that many nursing homes now maintain. It has been estimated by the HCFA and other Federal agencies that the additional number of RNs required as a result of this legislation would number about 6,000.

Home Health Care. With the decrease in length of stay in hospitals and the trend toward noninstitutional care, it is expected that home health care will become an increasingly important care setting. According to the sample surveys of registered nurses, the number of registered nurses employed by nonhospital-based home health care agencies increased 17 percent between November 1984 and March 1988, from an estimated 40,300 to 47,100. In addition, the 1988 survey estimated that there were 6,640 nurses providing home health care from hospital-based units.

Since the only data available on the number of home health care visits made is from the Health Care Financing Administration in connection with Medicare services, an analysis of number of registered nurses employed in relation to number and types of clients served cannot be made. However, it is of note that the increase in the number employed has occurred at the same time as there has been a decrease in the number of Medicare home health care visits. In 1984, those visits totalled 40,337,000 in contrast to 36,088,000 in 1987. Although neither can be tested with the available data, two possible causes of this seemingly contrary finding might be an increase in the number of non-Medicare visits and an increase in complexity of care requiring longer visits by registered nurses. Recently, Medicare limited reimbursement for home health care, undoubtedly causing a decline in the number of Medicare funded visits. Those disapproved visits may have, in part, been fulfilled through non-Medicaid means.

Lack of comprehensive data on home health care agencies precludes a detailed analysis of the total nursing personnel staff in these agencies. However, data from the Health Care Financing Administration on Medicare-certified home health care agencies as of May 1988 indicates that registered nurses are the predominant type of nursing personnel, followed by home health aides. Practical nurses were a relatively small proportion of the nursing personnel. About two-thirds of the 109,000 full-time-equivalent employees reported by HCFA were nursing personnel. Fifty-six percent of FTE nursing personnel were registered nurses; 39 percent, home health aides, and 6 percent, licensed practical/vocational nurses.

Other Areas. In addition to the changes noted above that affect the distribution of registered nurses throughout the health care system, others might be cited since they appear to reflect changes in the distribution of care settings. For these areas, too, no data are available for use in examining total nursing personnel employed and the relationship to the clients served.

One area that has shown relatively high growth is ambulatory care settings. The number of nurses employed in these settings increased 29 percent between the 1984 and 1988 sample surveys, from an estimated 97,400 to 125,800. This increase occurred in selected areas: group practice physician offices, free standing clinics, ambulatory surgical centers, and health maintenance organizations. The 27,000 nurses employed in free standing clinics and centers were more than double the number estimated in 1984. Although health maintenance organizations and group practice offices employed very small numbers of nurses, increases from 1984 to 1988 were relatively large, 55 percent and 44 percent, respectively. In 1988 an estimated 12,700 registered nurses were employed by health maintenance organizations and 27,400 by physicians in group practices. There was little change in nurse employment in traditional public health settings. Employment in State, city, county and other official health agencies was estimated at 39,500 in 1988 and 38,700 in 1984.

Selected Areas of Practice of Registered Nurses

A little over two-thirds of employed registered nurses are in staff-level positions and about 12 percent are in middle management positions as head nurses or supervisors. Almost 1 out of 5 are found in specialized practice, teaching or administrative positions (figure VIII-10). Although these positions usually require advanced education, some nurses qualified for them through experience and continuing education.

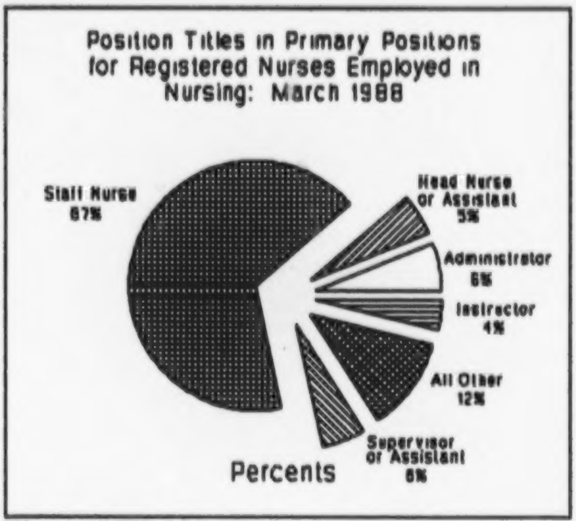


Figure VIII-10

Nurse Practitioners/Nurse Midwives. Of the 63,000 registered nurses who, according to the 1988 survey data, had formal nurse practitioner/nurse midwifery training, about 88 percent were employed in nursing. However, while over one-third have titles of nurse practitioner or nurse midwife, a large proportion fill a variety of positions, ranging from administrative to staff positions. Since the study did not include questions on the functions within the nurse's position, the extent to which and how the skills acquired in the training program are put to use in these positions cannot be determined. Nurses whose nursing practice positions carried the title of nurse practitioner or nurse midwife are a small proportion of employed registered nurses. Only 1.5 percent of the total, they number an estimated 23,535, including those with no formal training as nurse practitioners. Only 27 percent of nurse practitioners are employed in hospitals. About one-third are employed in ambulatory care settings and almost 30 percent are in community or public health settings. Five percent are self-employed.

Clinical Nursing Specialists and Nurse Clinicians. Clinical nurse specialists and nurse clinicians, experts in a specific area of clinical nursing practice, are a relatively small percentage of the registered nurse supply. In March 1988 there were an estimated 28,975 clinical nurse specialists (1.8 percent) and 17,628 nurse clinicians (1.1 percent). The major employment setting is the hospital (68 percent), although about 15 percent were employed in ambulatory care settings, 11 percent, in public health/community health, and 3 percent were self-employed. Although it is generally expected that these nurses would have master's degrees, the majority do not at this time. Thirty-four percent of clinical nursing specialists and 11.5 percent of nurse clinicians have master's degree preparation.

Nurse Administrators. In addition to nurses in positions requiring advanced, specialized, clinical skills, those in key management positions have responsibility for policy development, fiscal affairs, allocation of resources, strategic planning, and professional practice within the nursing department of a health care setting. In March 1988 there were an estimated 98,400 nurses with administrative position titles; 89,495 of whom were in top administrative positions in settings in which health care services are provided to the public, 5.5 percent of all employed registered nurses. These positions are found in a wide range of settings including relatively small health units providing a narrow range of services and large, complex, institutional or public or community health services.

The extent to which nurse administrators are engaged in the full array of management functions depends on the organizational structure of the setting and the complexity of the nursing services provided. The Secretary's Commission on Nursing pointed to the importance of recognizing the registered nurse's decision-making ability in order to promote nursing as a career and to improve patient care delivery. The Commission made specific recommendations pertaining to the inclusion of nurses in policy-making areas within the health care delivery organization. Nurses in key management positions in institutional, community-based, and corporate nursing services increasingly require business and fiscal preparation along with the professional practice base. Graduate education to prepare nurse administrators are geared to meet these requirements. At the present time, however, only about 20 percent of the 98,400 nurses with administrative position titles have at least a master's degree and only about 29 percent have a baccalaureate degree.

Nurse Educators. Faculty members in nursing educational programs and those who provide in-service and continuing education are vital to the assurance of a well-qualified nurse supply. In March 1988 there were an estimated 30,000 registered nurses employed in positions in formal nursing education programs and an additional 20,300 who had position titles of in-service director or instructor in service settings.

About half of those employed by nursing education programs are in baccalaureate or higher degree programs, 28 percent are in associate degree programs, 13 percent in practical nursing programs, and about 10 percent in diploma programs. There have been significant improvements over the years in the level of educational preparation of faculty in schools of nursing. In March 1988 almost three-quarters of the 30,000 nurses in these programs had at least a master's degree with 11 percent having doctorates. In November 1984, 62 percent had at least a master's degree and 9 percent, a doctorate.

Nurse Researchers. Although perhaps the smallest of the specialized nursing areas, nursing research is vital to the foundation of professional practice. The doctoral degree is generally the acceptable credential for research capability. As indicated earlier, an estimated 4,300 employed registered nurses had doctoral degrees in March 1988. Eighty percent were in administrative or teaching positions within nursing educational programs and 14 percent were employed in hospitals. Nursing research is primarily carried out under the aegis of educational programs and some faculty within those programs combine research with teaching students.

Of nurses with titles as researchers (estimated to number about 4,800 in March 1988), over 60 percent are employed in hospitals. Since over three-quarters of these nurses have less than a master's degree, it may be assumed that their primary responsibilities involve carrying out established research protocols rather than designing and initiating research projects.

Rates of Compensation

Current concerns about the shortage of registered nurses and potential nursing students have focused attention on the compensation provided to nurses. The Secretary's Commission on Nursing devoted a large part of its deliberations to questions of comparability and adequacy of salaries paid to registered nurses at entrance into nursing and over the total nursing career. Both aspects are seen as having an effect on recruitment and retention.

Beginning Salary Levels. In early 1988 the National League for Nursing surveyed registered nurses who received their first license to practice in the latter part of 1987. Over 9 of 10 of employed nurses in the study worked in hospitals. The average annual salary of the newly licensed nurse, employed on a full-time basis, was $22,582 (table VIII-7). Variation in average annual salaries for graduates from different types of programs was minimal, ranging from $22,201 for associate degree graduates to $23,161 for baccalaureate graduates. Diploma graduates average $22,383. Differences noted here, however, could be due to variation in salaries among geographic areas and types of employment settings.

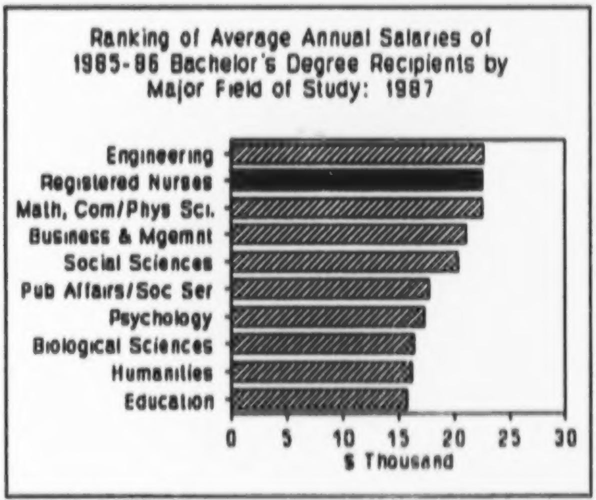


Figure VIII-11

Table VIII-7

AVERAGE ANNUAL SALARY FOR NEWLY LICENSED NURSES EMPLOYED ON A FULL-TIME BASIS, BY REGION: JULY 1987

REGION	AV. ANN. SALARY
UNITED STATES	$22,582
NEW ENGLAND	$24,675
MIDDLE ATLANTIC	$24,139
SOUTH ATLANTIC	$22,050
EAST SOUTH CENTRAL	$20,806
WEST SOUTH CENTRAL	$22,161
EAST NOTH CENTRAL	$22,127
WEST NORTH CENTRAL	$20,255
MOUNTAIN	$21,248
PACIFIC	$24,818

SOURCE: NATIONAL LEAGUE FOR NURSING. UNPUBLISHED DATA.

The study of 1985-86 baccalaureate graduates carried out in April 1987 by the National Center for Educational Statistics provides some insight into salary comparability between registered nurses and graduates with other types of educational majors (DOE, 1987). In that study, the average annual salary of a newly registered nurse, who was a baccalaureate graduate employed on a full-time basis, was $22,478. As can be seen in figure VIII-11, this salary ranked high among the different fields of study.

Salary Levels for All Registered Nurses. While entrance level salaries seem to be on a par with salaries provided to other new entrants into professional positions, data from the sample survey show a lack of significant progression as nurses continue in their careers. The average annual salary of all registered nurses employed on a full-time basis in March 1988 was $28,383. The average salary of staff nurses was $26,263. Those in administrative positions earned $34,564, a difference of $8,300, or 32 percent more than the average for a staff nurse.

Nurses employed in staff nurse positions in occupational health settings and in hospitals have the highest average annual salaries for staff level positions, $27,389 and $27,196, respectively (figure VIII-12). Staff nurses in ambulatory care settings have the lowest salaries, $21,528, followed by staff nurses in nursing homes and other extended care facilities, $22,381. The average salary of staff nurses in nursing homes show the largest increase between November 1984 and March 1988, 23 percent. The average salary of hospital staff nurses increased 21 percent. School health nurses and public health/community health nurses' average salaries showed the smallest increases.

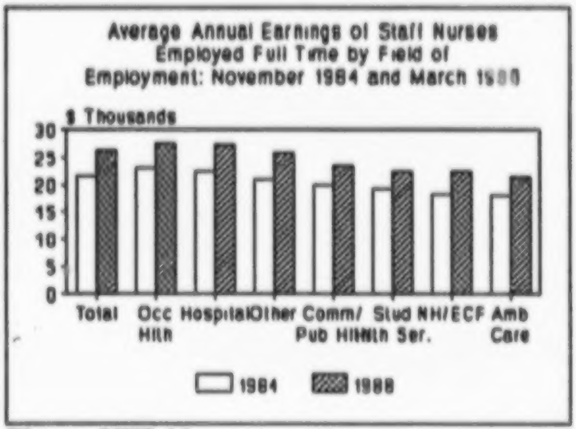


Figure VIII-12

The Outlook for the Future

Since the Second Report to the Congress (March 1979) a similar set of models has been used to derive projections of supply of and requirements for nursing personnel. Although model structures and the broad objectives of models have been consistent, the base data and assumptions upon which conclusions have been based in each report have been updated to reflect new information and the latest trends.

For this report, the March 1988 survey of registered nurses provided up-to-date information on numbers and characteristics of the registered nurse population and allowed for refinement of trends in personal and professional characteristics and employment. In addition, particular attention has been given to the issue of nursing shortages by incorporating such factors as evidences of demand in hospitals and new legal requirements for nurses in nursing homes.

Supply of Registered Nurses

The model to project supply of registered nurses (those employed in nursing) tracks the flow of cohorts of nurses from the time of graduation (or first entry into licensure). By examining age and education specific cohorts within each State, and changes resulting from migrations, educational upgrades, dynamics of movement in and out of the workforce and in and out of licensure, the model develops data on registered nurse licensees.

New Graduates. New graduates from basic nursing education programs, once they obtain licenses to practice, are the major source for new entrants into the registered nurse population (table VIII-8). Present projections of graduations are based essentially on the same assumptions as in the last report, with adjustments for actual graduations from 1985 through 1987, the actual number being lower than that anticipated for those years. Assuming no fundamental changes in the educational system preparing for registered nurse licensure, the projections took account of statistical trends in numbers of students in each type of program. The accelerated decline in number of diploma programs was assumed to continue, but some programs would remain throughout the projection period. The basis for the State-by-State statistical regression analysis used for projections for associate and baccalaureate degree graduates included historical data on number of these students, number of women first-time enrollments in institutions of higher education, and number of 17-44 year-old women in the population.

Table VIII-8

PROJECTED NUMBER OF GRADUATES FROM BASIC NURSING PROGRAMS PREPARING REGISTERED NURSES, BY TYPE OF PROGRAM: ACADEMIC YEARS 1990 THROUGH 2020

ACADEMIC YEAR	TOTAL	ASSOCIATE DEGREE	DIPLOMA	BACCALAUREATE
1990	61,700	39,600	5,000	17,100
1995	71,000	44,600	5,300	21,100
2000	66,600	42,600	4,200	19,800
2005	60,700	40,100	3,300	17,300
2010	57,700	38,000	2,600	16,400
2015	54,600	36,600	2,000	16,000
2020	53,200	35,800	1,600	15,800

SOURCE: DN PROJECTIONS

The projections took into account the most recent increase in admissions, assuming that declines in admissions had "bottomed out" and that numbers would return to 1986 levels by 1991. Estimates of graduations were based on appropriate lags in admissions and data on completion rates. Lower admission levels cause graduations to continue downward until 1990. Graduations then increase until the mid-1990s to a high of about 71,500, then gradually decrease throughout the remainder of the projection period as the size of the population groups from which students could be drawn decreases.

Since all new graduates need to achieve licensure status to be registered nurses, a further constraint on new additions to the registered nurse population in the early years of the projection period was the decline in license passage rates in 1988. Eighty-five percent of first-time examination takers passed compared to 91 percent the previous year. Retakers also had a lower passage rate than previously. It was assumed that rates would rise to pre-1988 levels by 1992.

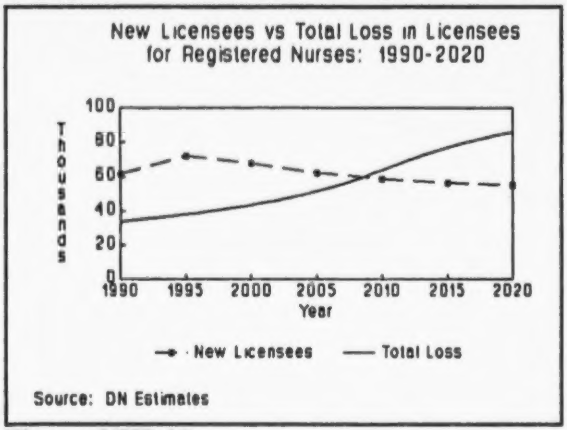
Added Education. Projections were also made of the number of registered nurses who pursued additional education after licensure so that population and supply projections reflect changing educational distribution patterns. Projecting the number of registered nurses obtaining a baccalaureate degree after licensure took into account trends in number of post-RN baccalaureate graduates and the pool of associate degree and diploma registered nurses from which these could be drawn.

Projections of master's degree graduates were maintained at the level used in the last report, which took account of the increasing number of students and the increasingly higher numbers of part-time students. The fact that numbers of graduates from baccalaureate programs have recently leveled off made it logical not to increase the output from master's degree programs. However, there appears to be an adequate number of baccalaureates to maintain the prior master's degree projections.

Net Losses from the Registered Nurse Population. New entrants into the registered nurse population are a relatively small part of the total number of nurses in any one year. The nurse population largely consists of those who have entered nursing over a period of years and have continued their licensure. No data are available on nurses who fail to renew their licenses to practice or who become relicensed after giving up all active licenses. However, by examination of trends from succeeding sample surveys, it is possible to derive "net losses" from the registered nurse population. Examination of the most recent data for each nurse age group led to assumptions of major changes in the net loss distribution.

Activity Rates. Because not all licensed nurses are engaged in nursing, to determine the supply, that is, those nurses available for employment, activity rates are developed within the model. Activity rates, which measure the propensity of nurses at particular ages to be in the nurse workforce, are assumed to change over time from initial rates (1988 national sample survey of registered nurses) to continue the trends observed to date. The activity rates for the registered nurse population have been increasing, particularly the middle-year age groups, so that further increases in these rates are projected. Furthermore, except for older age groups, activity rates at each age level are now fairly high. In view of this, the model does not include assumptions about influences that might induce a larger proportion of registered nurses to work.

Projections of Registered Nurses to 2020. The size of the RN population is a function of number of new licensees (and therefore new graduates) who have entered the profession and the number of registered nurses who failed to maintain their license for whatever reason (net loss) or have died (mortality). As long as the total loss (net loss plus mortality) is less than the new licensees, the RN population will continue to grow. When these numbers come into balance, the RN population will remain constant, and when the total loss exceeds the number of new licensees, the RN population will decline. As shown in figure VIII-13, the projected decrease of new licensees and increase in net loss cause the total loss and new licensee input to balance in 2009, each reaching a value of approximately 60,000, at which time the RN population attains its maximum value of 2,534,600 licensees. As the total loss exceeds the new licensees over the remainder of the projection period, the RN population declines to 2,313,600 licensees in 2020 (table VIII-9).



Source: DN Estimates

Figure VIII-13

Table VIII-9

REGISTERED NURSE POPULATION, SUPPLY,
AND FTE SUPPLY: 1990-2020

	REGISTERED NURSE		
AS OF DECEMBER 31	POPULATION	SUPPLY	FTE SUPPLY
1990	2,118,900	1,687,100	1,414,800
1995	2,288,300	1,813,300	1,528,900
2000	2,431,400	1,912,600	1,623,600
2005	2,518,900	1,947,600	1,659,000
2010	2,531,200	1,900,100	1,621,600
2015	2,455,300	1,780,400	1,519,800
2020	2,313,600	1,642,900	1,403,600

FTE=FULL-TIME EQUIVALENT

SOURCE: DN PROJECTIONS

The registered nurse supply reaches a maximum of 1,947,600 approximately 4 years prior (2005) to the time the population reaches its maximum. The full-time-equivalent supply also peaks in 2005 at 1,659,000. Peaking of supply before the population peaks is caused by different activity rates of each age group (table VIII-10) and changes in age distribution over the projection period.

Table VIII-10

ACTIVITY RATE OF REGISTERED NURSES BY AGE GROUP,
AND PERCENT OF POPULATION OVER 50: 1990-2020

AGE GROUP	1990	1995	2000	2005	2010	2015	2020
ALL RNS	79.6	79.2	78.7	77.3	75.1	72.5	71.1
20-24	97.8	97.9	97.9	97.9	97.9	97.9	97.8
25-29	92.0	92.1	92.1	92.1	92.1	92.1	92.1
30-34	87.3	87.3	87.5	87.7	87.9	88.0	88.2
35-39	86.5	86.7	87.2	87.7	88.0	88.4	88.7
40-44	85.1	85.3	85.5	85.8	86.0	86.3	86.5
45-49	83.2	83.6	83.9	84.4	84.6	84.9	85.2
50-54	78.9	79.1	79.6	79.9	80.3	80.6	80.7
55-59	69.7	70.0	70.3	70.5	70.8	70.9	71.3
60-64	49.8	48.3	47.8	46.9	45.6	44.6	43.8
65-69	25.6	25.1	24.8	24.9	23.9	23.7	23.6
70-74	14.4	14.8	15.1	13.3	12.7	12.1	11.7
PERCENT OF POP. OVER 50	26.8	29.2	35.1	44.1	50.7	53.4	52.7

SOURCE: DN PROJECTIONS

Combination of activity rates for each age group and aging of the registered nurse population results in the aggregate activity rate declining from the current 80 percent to 71.1 percent by 2020. After 2005, the increase shown in the RN population between that year and 2009 no longer offsets the decreasing aggregate activity rate. Table VIII-11 shows the effects of the projection of RN supply in relation to the country's population to be served. The supply of RNs per 100,000 population increases through 2000, when it reaches a maximum of 713 and then declines to 558 by 2020.

Table VIII-11

PROJECTIONS OF TOTAL REGISTERED NURSE SUPPLY AND FULL-TIME EQUIVALENT SUPPLY RATIOS:1990-2020

YEAR	TOTAL RNs PER 100,000 POPULATION	FTE RNs PER 100,000 POPULATION
1990	674	565
1995	697	588
1000	713	605
2005	707	602
2010	672	574
2015	616	526
2020	558	477

SOURCE: DN PROJECTIONS

Educational Distribution of Registered Nurses. The levels of highest educational preparation of RNs projected to be in the nurse supply change for a number of reasons.

The number of RNs with an associate degree or diploma as highest level of preparation declines from 1990 to 2020 (table VIII-12). The number of diploma program trained nurses continues to decline because of aging of the nurse population (more older nurses trained in these programs) and the near disappearance of diploma education programs. Associate degree programs are projected to remain as the dominant source of new graduates, but their numbers can only offset a fraction of the diploma loss.

Associate/diploma highest educational preparational level declines from 1,027,700 in 1990 to 698,400 in 2020, from 62.2 percent to 43.4 percent of the total supply. Registered nurses with a baccalaureate degree as highest level of preparation

Table VIII-12

HIGHEST EDUCATIONAL PREPARATION OF REGISTERED NURSE SUPPLY: 1990-2020

YEAR	TOTAL	A.D. & DIPLOMA	BACCA-LAUREATE	MASTER'S & DOCTORATE
1990	1,687,100	1,027,700	535,500	124,000
1995	1,813,300	1,028,200	624,600	160,400
2000	1,912,600	1,011,000	695,600	206,100
2005	1,947,600	965,100	734,600	247,900
2010	1,900,100	885,600	733,900	280,600
2015	1,780,400	784,100	693,800	302,500
2020	1,642,900	698,400	627,000	317,500

SOURCE: DN PROJECTIONS

increase slightly from 535,500 in 1990 to 627,000 in 2020, from 30.5 percent to 37.8 percent of the total supply. Nurses with a master's or doctorate as highest level of preparation rises from 124,000 in 1990 to 317,500 in 2020, from 7.3 percent to 18.8 percent of the total supply. This level shows the largest numerical increase from 1990 to 2020 (193,500) as well as the largest percentage gain (156 percent).

Distribution of Registered Nurses Within States. As seen in table VIII-9, the Nations' RN supply is expected to decrease 2.6 percent between 1990 and 2020. However, the behavior of the State supply during the same period varies considerably depending on education projections and the initial educational-age distribution of the nurse population within a particular State. Caution should be used in interpreting State projections, particularly those with relatively small nurse populations, because of small sample sizes that may cause estimates to differ noticeably from the true value of the population attribute measured. Changes in registered nurse supply in many States is not unlike that of the national trend - 14 States changed 5 percent or less over the entire projection period (figure VIII-14).

The nurse supply in nine States increased from 6 percent to 20 percent from 1990 to 2020, while 13 States decreased from 6 percent to 20 percent. Eight States increased more than 20 percent (the greatest increase was 78 percent), and seven States decreased more than 20 percent (the greatest decrease being 54 percent). The majority of States, like the Nation, attain maximum supply levels after year 2000 and then decline. The projected supply of registered nurses in each State in the year 2000 can be seen in table VIII-A-4. The full-time equivalent supply is in table VIII-A-5.

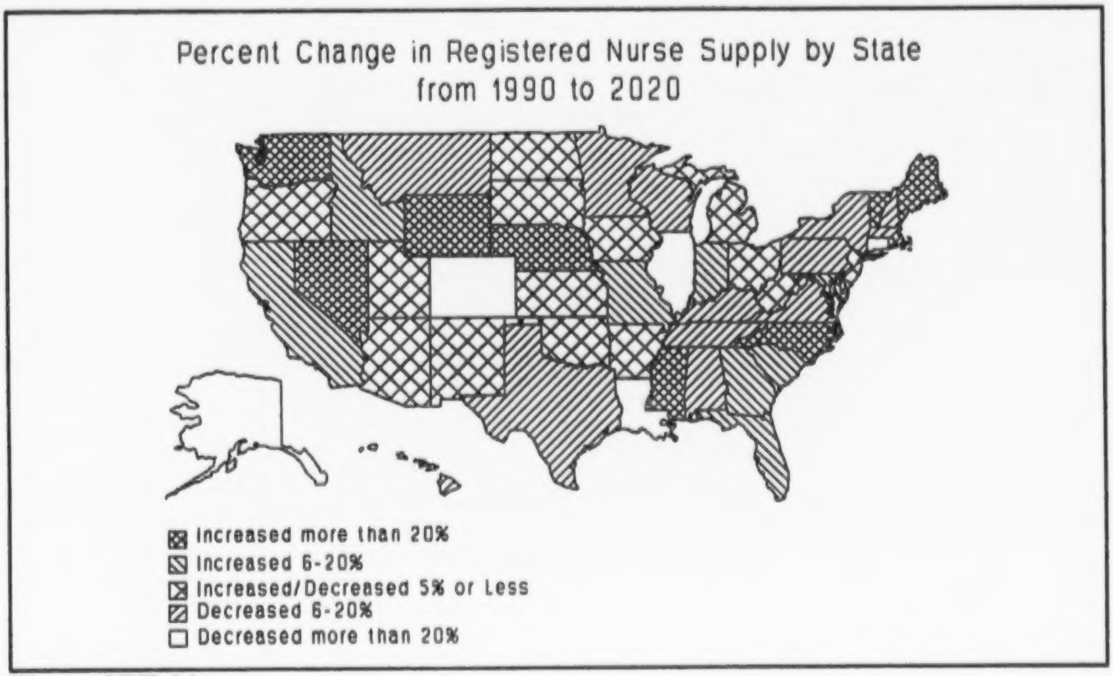

Percent Change in Registered Nurse Supply by State
from 1990 to 2020
▩ Increased more than 20%
▧ Increased 6-20%
☒ Increased/Decreased 5% or Less
▨ Decreased 6-20%
☐ Decreased more than 20%

Figure VIII-14

Requirements for Nursing Personnel

Examination of requirements for nursing personnel in the future can be made from a variety of perspectives. Two approaches have been used for this report. The historical trend-based model generates future requirements as a function of past and current trends of provided services and nursing utilization, as modified by assumptions about how the health care system may change in the future. The criteria-based model is based on professional judgment and assumed the attainment of major health care and nursing goals in determining future requirements.

In addition to the results of these models, this section reports briefly on one other set of projections covering nursing personnel. The Bureau of Labor Statistics develops projections of the United States economy that provide employment projections for various occupational groups. Included are the nursing personnel occupational groups.

Underlying Assumptions About Health Care Services. Development of projections of requirements for nursing personnel depend upon future health services needed and supplied and utilization of nursing personnel in providing those services. A number of underlying assumptions about the future population and health services required were used in the projections for the historical-trend based and the criteria-based models.

Changes in components of the U.S. population were based directly on projections of the population of States and United States by the Bureau of the Census (total population increase over the projection period is 21 percent). The general thrust of projections of provided services reflected a case management scenario including a substantial growth of HMO and PPO membership (to approximately 48 percent of the total population in 2020). Additionally, for the entire projection period the following increases in provided services are estimated: visits to all types of physicians offices, 41 percent, community hospital inpatient days, 17 percent, outpatient visits, 11 percent, nursing home days, 22 percent, and home health visits, 66 percent. The trend projected for all physician offices consists of two major components, HMO and PPO visits and visits to traditional (fee-for-service) offices. The latter grows sharply in the early part of the projection period followed by a moderated growth rate to 2020. Traditional office visits grow initially, but decline as HMO and PPO components expand; thus, total projected number of physician office visits gradually declines.

The Historical Trend-Based Model

The model considers requirements for registered nurses on the basis of major categories of health care providers employing registered nurses: community hospitals, all other hospitals, nursing homes, community health, physician offices (including HMOs and PPOs along with traditional office based settings), nursing education, and other miscellaneous settings as a group. There are three major categories of trends considered: components of the population, provided services, and utilization of full-time equivalent nurses per provided services. Since no current estimates of licensed practical/vocational nurse utilization were available, it was not possible to make projections of LP/VN requirements.

The model itself, as its name indicates, is predicated on the assumption that historical trends will determine future behavior of the health care system. The validity of this assumption is affected by the extent to which the introduction of forces or events change the behavior pattern of the system. Another assumption was that RN utilization per provider service would not fall below current levels. Cost containment efforts by government, the private sector, and the health care industry place constraints on growth of nursing home beds, a slowing growth of RN hours per patient day in community hospitals, and, as noted above, encourage growth in HMO and PPO enrollment.

There are two major sectors of the health care system that were subjected to additional assumptions about RN utilization. The total number of FTE RNs employed in hospitals included those employed by a temporary or contract service as well as those on the hospital payroll. This increased the total number 2 percent. Additionally, the December 1987 Hospital Nursing Personnel Demand Survey conducted by the AHA, collected data on overtime hours worked by RNs in respondent hospitals (AHA 1987b). These data reveal that number of overtime hours worked annually is equivalent to approximately 5 percent of total FTE RNs employed in hospitals. Therefore, RN utilization rates in community hospitals were increased to reflect this actual level of RN employment. The combination of temporary/contract RNs and amount of estimated overtime hours worked by RNs amounts to 7 percent more FTE RNs utilized in community hospitals than would be the case if only those on the payrolls of hospitals were included in the utilization rate.

Legislation contained in the Omnibus Budget Reconciliation Act of 1987 specifies levels of RN employment in certified nursing homes that are greater than many of these homes currently employ. Because the estimates indicate that these homes will need to employ an additional 6,000 RNs to meet legislative requirements, the utilization rate for RNs in this setting was conservatively increased by 6 percent according to estimates contained in Chapter II of Volume II in the Secretary Commission on Nursing Report (DHHS, 1988c).

Registered Nurse Requirements. Using the assumptions outlined above, the projection of registered nurse requirements generated by the historical trend-based model shows an increase of 41.1 percent in FTE RN requirements for the 1990 to 2020 period (table VIII-13).

This is an increase of 664,300 FTE RNs over the 30 year projection period. The hospital area increases by 291,800 FTE RNs or 26.3 percent while nursing homes increase 59,000, 57.4 percent. The latter increase largely reflects an increase in RN utilization over the projection period since the number of resident days increases only by 22 percent. The nursing education area shows the smallest absolute and relative increase: 3,900 and 17.2

Table VIII-13

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES
FROM THE HISTORICAL TREND-BASED MODEL, BY AREA OF PRACTICE: 1990-2020

	YEAR						
AREA OF PRACTICE	1990	1995	2000	2005	2010	2015	2020
TOTAL	1,614,200	1,811,000	1,967,000	2,071,000	2,142,400	2,209,500	2,278,500
HOSPITAL	1,110,100	1,225,600	1,307,300	1,358,300	1,373,500	1,387,900	1,401,900
PHYSICIAN'S OFFICE	143,400	174,600	203,000	210,200	217,000	217,400	215,200
NURSING HOME	102,800	116,400	129,900	141,400	150,800	156,100	161,800
COMMUNITY/PUBLIC HEALTH	170,500	196,400	222,200	250,500	284,000	323,800	367,700
NURSING EDUCATION	22,900	27,800	28,100	27,400	26,900	26,700	26,800
OTHER	64,600	70,200	76,500	83,200	90,200	97,600	105,100

SOURCE: DN PROJECTIONS

percent. The number of FTE RN educators required is very sensitive to enrollment levels in each educational program. Enrollment numbers can be gauged by numbers of graduations, which peak in the 1995-2000 period and then decline until 2020 (table VIII). Therefore, enrollment levels can be expected to follow a similar course, peaking early in the projection period and then declining. Nurse educators required, following the same pattern, reach a maximum in the 1995-2000 period and decline, but remain above 1990 levels.

The community health area consists of four subareas: school nursing (in primary, secondary and post-secondary settings), occupational health, home health, and other community settings. All show growth in FTE RN requirements, particularly the home health area. By 2020 the overall requirements in this area increase by 197,200 or 115.7 percent. Physician offices have a total increase of 71,800 or 50.1 percent, which represents the requirements for HMO and PPO settings and traditional fee-for-service settings. RN utilization in HMOs is somewhat less per visit than in traditional fee-for- service settings. Since traditional setting visits reach a peak in the middle of the projection period and HMO-PPO visits increase throughout the period, RN requirements will reach a peak toward the end of the projection period and then fall somewhat by 2020.

The "other" practice area includes registered nurses who work as private duty nurses, self-employed nurses, and those not fitting into any other employment category. Generally, the number of private duty nurses will remain fairly constant in the future, while those who are self-employed or employed in settings (as nurses) not included in the practice areas identified will continue to rise in the future, ultimately increasing by 40,500 or 62.7 percent.

State Registered Nurse Requirements. The cautions stated earlier concerning the variability of State level data and projections also pertain to the requirements area. State projections of requirements for nurses follow the same pattern shown by the national projections with 18 States increasing from 40 to 50 percent over 1990 levels (figure VIII-15).

Eight States show increases of at least 30 percent but less than 40 percent, while only seven States increase less than 30 percent, the lowest increase being 17 percent. Ten States increase more than 50 percent, but less than 70 percent, eight States increase 70 percent or more, and the largest increase is 101 percent. The States also follow the national trend during the projection period in that State requirements continue to increase from 1990 to 2020. The projected requirements for each State one in table VIII-A-6.

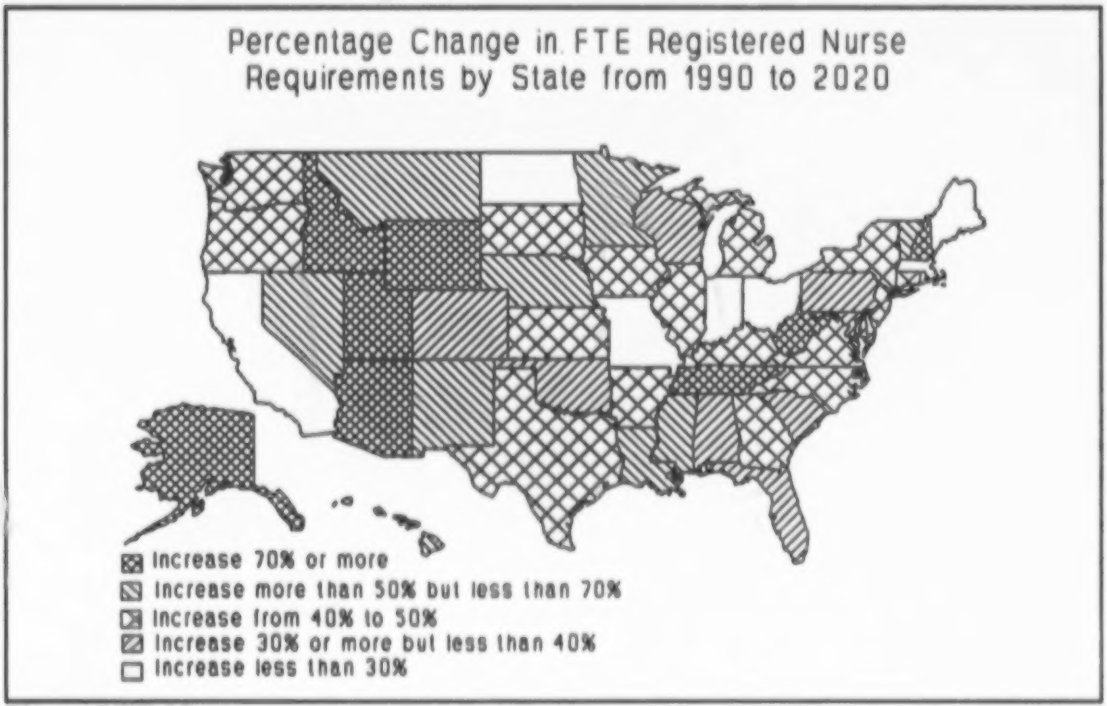

Percentage Change in FTE Registered Nurse
Requirements by State from 1990 to 2020
▩ Increase 70% or more
▧ Increase more than 50% but less than 70%
▦ Increase from 40% to 50%
▨ Increase 30% or more but less than 40%
☐ Increase less than 30%

Figure VIII-15

The Criteria-Based Model

An entirely different approach to projecting requirements is taken by the criteria-based model, which generates future requirements for nurses by estimating needs on the basis of goals reflecting appropriate maintenance or restoration of a population's health care status and quality of care. This approach, in contrast to a model focusing on historical trends, relies heavily on professional judgement for assumptions and estimates regarding optimum nursing care needs, ideal staffing requirements, desirable educational mix of personnel, and other key considerations. Its results, consequently, similar to other professional judgement approaches, are often reflective of the diversity and experience of the specific panelists involved in the modeling exercise.

Nothwithstanding such caveats, however, this modeling approach does provide another helpful, comparative perspective for forecasting purposes. It is within this analytic context that the model is described here and its latest interaction presented. As noted elsewhere in this report, work is presently underway within the Division of Nursing to expand the methodologies for projecting nursing requirements, specifically undertaking developmental work regarding demand projections. It is anticipated that the 8th Report on the Status of Health Personnel in the United States will provide preliminary results from that effort.

The criteria-based model uses a detailed framework of practice areas that includes all segments of the health care system employing nurses. The estimated needs for each practice area also specify the mix of types of nursing resources (RNs, LP/VNs, ancillaries) and the projected numbers of RNs by level of education for each practice area specified by the framework.

This method, initially developed in 1977, was reviewed and updated in 1980, 1984, and 1987, and most recently in 1989. The model relies on a panel of experts to identify health care goals and nurse utilization rates, using an iterative process for all nursing utilization specifications. An attempt is made to select experts who possess varied backgrounds of experience and knowledge on many aspects of nursing and the health care system. The panel convened in 1989 consisted of representatives from all levels of nursing practice and education and included clinical nurse specialists, nurse practitioners, certified nurse midwives, and administrators of nursing services. In addition, two physicians, an economist, and representatives from 16 organizations attended. The Panel was divided into three groups for discussion purposes: institutionally-based; non-institutionally based, and advanced practice.

Deliberations of the panel captured the changes occurring in nursing practice and reexamined those levels of services where current levels seemed less than adequate. The process also included discussion of adequacy and appropriateness of certain segments of the model itself.

A basic premise of the criteria-based model is that nurse utilization levels should be specified that represent two distinct health care objectives. First, utilization levels that some States might consider attainable and could therefore work to achieve (specified as the lower bound) and, second, specification of levels that States could use largely as a framework to guide their use of nursing resources (specified as the upper bound). An assumption of universal access to care is a critical aspect of this modeling process.

The panel also assumed that changes would continue in the health care system. Hospital services would continue to change since inpatients would have higher acuity levels, and more surgery would be performed in ambulatory settings. The trend towards prospective payment systems (PPS) would continue and would be applied in other health care settings. This would include continued expansion of HMO and PPO enrollments: approximately 50 percent of the population would be enrolled in one of the organizations by the year 2000, according to the panel. Another major assumption of the panel was that the decline in utilization of licensed practical/vocational nurses would continue, and that by 2000, these nurses would be employed only in institutional settings (hospitals and nursing homes). An assumption was made by the panel that by 2010, all nurses would have at least associate degree preparation. The panel also assumed that the roles of clinical nurse specialists and nurse practitioners would merge and that the distinction between the two would essentially disappear. The number of nurse practitioner certificate programs has fallen dramatically and the ANA goal is that by 1992 all nurse practitioners will be prepared in master's programs that will end differences in educational preparation. The panel assumed that in the future there would be only two types of basic nursing preparation, the baccalaureate (four-year program) and the associate degree (two-year program).

Projections of Nurse Requirements. The projected levels of nurse requirements for 2000 obtained through the process outlined above indicate that under the lower bound assumptions, a total of 2,102,000 FTE RNs will be required - an increase of 738,000 over the number employed in 1988, an increase of 54 percent (table VIII-14). State projected requirements from the criteria-based model are found in tables VIII-A-7 and 8.

Table VIII-14

PROJECTED REQUIREMENTS* FOR FULL-TIME EQUIVALENT NURSING PERSONNEL
FROM THE CRITERIA-BASED MODEL, BY AREA OF PRACTICE: FOR 2000

	LOWER BOUND			UPPER BOUND		
AREA OF PRACTICE	RNs	LP/VNs	AIDES	RNs	LP/VNs	AIDES
TOTAL	2,102,000	345,500	1,395,700	2,657,800	343,000	1,685,200
HOSPITAL	1,253,800	66,800	255,700	1,582,400	38,300	237,700
NURSING HOME	291,300	278,700	839,000	340,400	304,700	891,900
NURSING EDUCATION	41,400	0	0	52,600	0	0
COMMUNITY/ PUBLIC HEALTH	236,200	0	226,200	251,700	0	424,700
AMBULATORY CARE	268,800	0	74,800	417,500	0	130,900
OTHER	10,500	0	0	13,200	0	0

* PRELIMINARY DATA

SOURCE: DN PROJECTIONS

Hospitals are projected to require 324,000 more FTE RNs (not counting the additional number of FTE RNs gained through increased overtime) than were employed in 1988, an increase of 35 percent. However, the more striking result is the increase of 203,000 FTE RNs that will be needed in the nursing home area -

nearly two and one-half times the number employed in 1988. This increase is due to the panel's conclusion that nursing home residents will fall into three categories of care: functionally dependent with complex needs, functionally dependent but stable, and functionally assisted. The first category of resident requires the greatest amount of nursing care. Estimated at 5 percent of the current resident population, this category will likely double by 2000. The second category requires a lesser amount of nursing care and comprises the bulk of nursing residents at present and in 2000. The increasing acuity of the typical nursing home resident combined with a RN utilization rate higher than currently available produce a future FTE RN requirement that is much larger than the number of FTE RNs employed in nursing homes today.

The community health/public health area also calls for substantial increases, 81,000 FTE RNs or 52 percent more than the current employment level, in response to the panel's considerations of a number of unmet needs such as those in the maternal child health area. Ambulatory care also shows a considerable increase in requirements.

In addition to considering nurse utilization by function and type of setting, the panel distinguished among levels of educational preparation required of registered nurses to carry out needed functions in the most effective way. In 1989, as in prior years, definitions were based on what the panel judged to be needed. Given the current educational distribution of registered nurses, the criteria established can only be considered as goals, as shown in the subsequent section comparing the projections of requirements with the supply projections.

Projected Employment of Nursing Personnel. The Bureau of Labor Statistics develops projections of the U.S. economy including projections of future employment in various occupations. Included are registered nurses, licensed practical nurses, and nursing aides. The occupational classifications followed by BLS are different from those used to define nursing in this report and are reflected in BLS data. For some industries, nursing personnel employed may not be identified separately. However, conclusions drawn in these projections are of interest to a general discussion of future nursing requirements.

Based on moderate level projections for the year 2000 that BLS released in 1987, they saw an increase of about 612,000 positions between 1986 and 2000 for registered nurses, a 44 percent increase. BLS saw the demand for registered nurses to be particularly strong in hospitals because cost containment pressures will have nurses assuming some duties of other health personnel. Rapid growth in employment of registered nurses in physicians' offices was also predicted due to increases in the size of physician practices and more sophisticated medical technology. It was also expected that there would be rapid growth in registered nurse positions in nursing homes.

Projections for employment of licensed practical nurse also reflected substantial growth, about 238,000 positions between 1986 and 2000, a 38 percent increase. BLS estimated that many of the licensed practical nurses would be employed in nursing homes, which would grow in response to an aging population. Employment of nursing aides would also grow by 33 percent, an increase of about 361,000 jobs between 1986 and 2000. Home health aides was seen as one of the fastest growing categories with an 80 percent increase in number of positions between 1986 and 2000.

A Comparative Review of Projections for the Future

Given the sensitivity of each model to a large number of assumptions, the 6.2 percent difference in the overall projections for the year 2000 between the historical trend-based and the lower bound criteria-based model indicates good agreement (table VIII-15).

In specific areas of nursing practice, however, some significant differences are noted. The nursing home area shows a large difference in projections, undoubtedly a result of the panel's consideration of the shift in level of care needs that require a significant nursing response. This same applies to the ambulatory care area where the criteria-based projection is noticeably larger than that of the historical trend-based model. Of interest in this connection is that the BLS pointed to the nursing home and physician office area as having rapid growth in employment of RNs.

Table VIII-15

COMPARISON OF FTE RN REQUIREMENTS FROM THE HISTORICAL TREND-BASED MODEL AND CRITERIA-BASED MODEL: FOR 2000

AREA OF PRACTICE	HISTORICAL TREND-BASED	CRITERIA-BASED LOWER BOUND	CRITERIA-BASED UPPER BOUND
TOTAL	1,967,000	2,102,000	2,657,800
HOSPITAL	1,307,300	1,253,800	1,582,400
NURSING HOME	129,900	291,300	340,400
NURSING EDUCATION	28,100	41,400	52,600
COMMUNITY/ PUBLIC HEALTH	222,200	236,200	251,700
AMBULATORY CARE	203,000	268,800	417,500
OTHER	76,500	10,500	13,200

FTE=FULL-TIME EQUIVALENT

SOURCE: DN PROJECTIONS

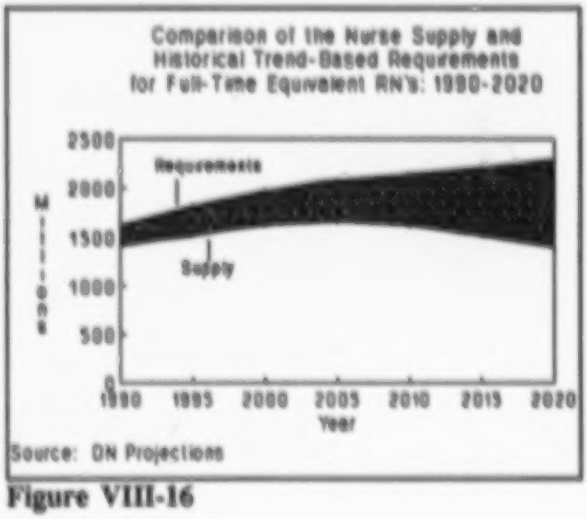
Throughout the projection period, the requirements for FTE RNs, as estimated by the historical trend-based model, exceed the supply (figure VIII-16). Initially, this occurs because of the specific assumptions regarding accounting for overtime hours worked in hospitals and legislation affecting nursing homes (see previously discussed specific assumptions in the Historical Trend-Based Model).

The difference between the projections continues to widen throughout the projection period as requirements continue to increase. The requirements increase by nearly 50,000 per year immediately after 1990, slowing to somewhat over 20,000 per year by 2020. For reasons noted earlier, the supply, while initially increasing somewhat over 20,000 per year immediately after 1990, will reach a peak at 2005 when there is no increase and, finally, will fall by more than 20,000 per year at 2020 when it will be just under its 1990 level.

The highest educational preparation of the required FTE RNs as projected by the criteria-based model and the FTE RN supply estimated to be attained show considerable divergence (figure VIII-17). According to the lower bound projected requirements, about 692,000 FTE RNs with educational preparation at associate degree/diploma level would be required compared with an estimated supply of 848,000. However, for baccalaureate prepared FTE RNs, the situation is reversed: 1,019,000 required and 591,000 in the supply.

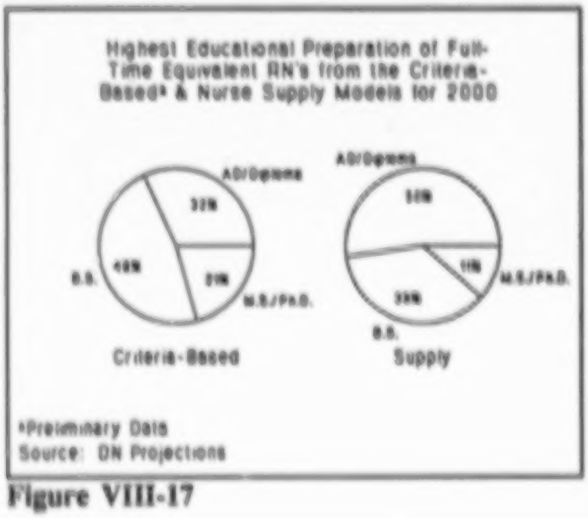
Similarly, about 392,000 masters' and doctoral prepared FTE RNs would be required with supply estimated at 185,000.

An important assumption underlying the deliberations of the panel was that the baccalaureate level of preparation would become the minimum standard for professional practice, and that there would be significantly greater need for nurses with specialized preparation at the master's level and above. As pointed out earlier, the panel recognized that their criteria with respect to the required educational mix of nurses could only be considered as goals. Given the current and anticipated trends in educational levels, these could be difficult to achieve.


Comparison of the Nurse Supply and Historical Trend-Based Requirements for Full-Time Equivalent RN's: 1990-2020

Source: DN Projections

Figure VIII-16


Highest Educational Preparation of Full-Time Equivalent RN's from the Criteria-Based* & Nurse Supply Models for 2000

*Preliminary Data
Source: DN Projections

Figure VIII-17

Conclusions and Recommendations

Data from the March 1988 National Sample Survey of Registered Nurses document the increasing supply of registered nurses projected in prior reports. At the same time the data indicated a number of factors that show little change or improvement. The racial/ethnic composition of registered nurses has not changed. Despite the increase in the overall supply of registered nurses, the number from racial/ethnic minority backgrounds remained the same from November 1984 to March 1988. Although all States have had an increase in their nurse supply over the 10-year span of sample surveys and the southern area had relatively larger increases than other areas, its nurse to population ratio was still well below the other areas.

After several years of decline, admissions and enrollments in educational programs preparing for registered nurse practice increased in 1988, although graduations decreased reflecting the substantial declines in admissions in the previous three years. Furthermore, admissions levels in 1988 were still substantially below those of the early 1980s.

The 1988 sample survey disclosed an increasing age level of the registered nurse population. Assuming no major shifts in current trends, although it is anticipated that graduation levels will improve through the mid-1990s, the combined effects of fewer new graduates and the older ages at which students are graduating from nursing educational programs lead to continuing significant increases of age level of the overall nurse population. The previous Report to Congress on Nursing indicated that these trends will lead to a decline in nurse supply within the next 15 or so years and continuing declines thereafter. Recent data show that these trends are even more pronounced. Based on current information, the registered nurse supply in 2020, in relation to the population forecast for that time, would be 558 per 100,000 persons in contrast to 713 in 2000 and 668 in March 1988. On the other hand, when the changing population and current trends in nursing and health services utilization are taken into account, requirements for RNs are projected to increase.

An area which has shown improvement over the years is the educational attainment of registered nurses. Significantly more registered nurses are prepared at the baccalaureate and graduate levels today than a decade ago. When current trends in nursing education are taken into account it is expected that the number of baccalaureate and graduate level degree nurses will continue to increase. However, the March 1988 survey shows that a substantial proportion of registered nurses in leadership positions still do not have educational levels considered appropriate for the positions. As the needs for such personnel increase, the gap will continue between available supply of nurses with baccalaureates and advanced degrees and anticipated requirements.

The Secretary's Commission on Nursing, established to examine the nursing situation and to recommend actions, completed its work in December 1988 (DHHS, 1988c). The

Commission's recommendations included steps for both public and private sectors. While the Commission was concerned with current indications of nursing shortages, the solutions proposed looked toward future changes. Recommendations included measures to examine and ensure appropriate utilization of nursing resources as well as steps to increase the attraction of nursing as a career.

The Department of Health and Human Services has approved a plan developed by the Public Health Service to implement recommendations of the Commission. The plan, as described in chapter IV-C, coordinates PHS activities underway in areas such as research, financial assistance and program development within available resources. It establishes new initiatives through reexamination, priority setting, and targeting, and includes liaison activities with the private sector and other public entities for reducing nursing shortages.

The need for continued analysis to assess availability of nursing resources and the health system's requirements for these services is also evident. The importance of developing appropriate data bases for monitoring nursing resources was stressed by the Commission. The Bureau of Health Professions has obtained valuable information from a group of knowledgable experts on the extent of data available, the most appropriate sources and approaches, and study priorities to fill gaps.

The data in this Seventh Report to Congress also underscore the need to address the nursing educational system from different aspects. Consideration has to be given to development of approaches to attract nursing students from a broader population base. Also, concerted efforts are needed to ensure that available nursing education opportunities are appropriate to the changing needs of society and the preparation of nurses able to provide expert care and leadership.

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Table VIII-A-1. Admissions to and Graduations from Nursing Educational Programs Preparing Registered Nurses, by Type of Program and Geographic Area, 1987-1988

Geographic area	Admissions				Graduations			
	Total	Baccalaureate[1]	Associate Degree	Diploma	Total	Baccalaureate[1]	Associate Degree	Diploma
United States	94,594	28,732	57,473	8,389	64,915	21,542	37,435	5,938
New England	5,203	1,717	2,874	612	3,904	1,609	1,768	527
Connecticut	1,200	516	457	227	733	286	282	165
Maine	421	226	195	0	288	166	122	0
Massachusetts	2,545	715	1,482	348	2,029	796	942	291
New Hampshire	422	81	341	0	305	97	179	29
Rhode Island	402	104	261	37	404	193	169	42
Vermont	213	75	138	0	145	71	74	0
Middle Atlantic	18,116	4,483	10,511	3,122	12,280	3,821	6,261	2,198
New Jersey	3,009	681	1,459	869	1,731	382	847	502
New York	9,349	2,184	6,743	422	6,090	1,762	4,002	326
Pennsylvania	5,758	1,618	2,309	1,831	4,459	1,677	1,412	1,370
South Atlantic	15,178	4,023	10,254	901	10,131	3,045	6,556	530
Delaware	370	117	236	17	278	137	133	8
District of Columbia	449	359	90	0	246	191	55	0
Florida	3,651	652	2,920	79	2,715	521	2,143	51
Georgia	2,075	561	1,420	94	1,236	415	745	76
Maryland	1,449	388	927	134	1,026	345	609	72
North Carolina	2,881	553	2,150	178	1,722	508	1,126	88
South Carolina	1,239	355	884	0	846	309	537	0
Virginia	2,149	753	1,077	319	1,459	476	799	184
West Virginia	915	285	550	80	603	143	409	51
East South Central	8,170	2,763	4,958	449	4,860	1,657	2,974	229
Alabama	2,003	834	1,136	33	1,430	568	842	20
Kentucky	1,879	607	1,272	0	1,148	365	783	0
Mississippi	1,440	322	1,118	0	851	309	542	0
Tennessee	2,848	1,000	1,432	416	1,431	415	807	209
West South Central	9,830	3,356	5,788	686	5,641	2,049	3,213	379
Arkansas	1,306	310	684	312	670	200	380	90
Louisiana	1,558	911	412	235	999	490	328	181
Oklahoma	1,335	407	928	0	786	254	532	0
Texas	5,631	1,728	3,764	139	3,186	1,105	1,973	108
East North Central	16,886	5,531	9,709	1,596	12,727	4,534	6,890	1,303
Illinois	3,840	1,162	2,418	260	2,974	984	1,712	278
Indiana	2,496	1,116	1,263	117	1,755	774	845	136
Michigan	3,521	1,069	2,298	154	2,763	850	1,755	158
Ohio	4,960	1,219	2,705	1,036	3,753	1,198	1,868	687
Wisconsin	2,069	965	1,025	29	1,482	728	710	44
West North Central	7,761	2,736	4,208	807	5,345	1,896	2,844	605
Iowa	1,668	377	1,124	167	1,135	322	699	114
Kansas	1,165	403	723	29	843	291	519	33
Minnesota	1,570	445	1,125	0	1,125	415	710	0
Missouri	1,962	601	860	501	1,397	352	666	379
Nebraska	663	538	71	54	288	185	41	62
North Dakota	191	191	0	0	179	179	0	0
South Dakota	542	181	305	56	378	152	209	17
Mountain	4,200	1,305	2,895	0	2,906	918	1,988	0
Arizona	970	270	700	0	767	247	520	0
Colorado	873	299	574	0	552	210	342	0
Idaho	391	78	313	0	228	26	202	0
Montana	322	220	102	0	203	144	59	0
Nevada	268	71	197	0	182	35	147	0
New Mexico	731	77	654	0	385	71	314	0
Utah	450	231	219	0	454	162	292	0
Wyoming	195	59	136	0	135	23	112	0
Pacific	9,250	2,818	6,266	166	7,121	2,013	4,941	167
Alaska	166	126	40	0	46	26	20	0
California	6,320	1,720	4,434	166	4,969	1,283	3,519	167
Hawaii	345	170	175	0	202	90	112	0
Oregon	875	288	587	0	755	248	507	0
Washington	1,544	514	1,030	0	1,149	366	783	0

1/ Includes students in a few generic programs leading to a master's or doctoral degree.

SOURCE: National League for Nursing. Unpublished data.

Table VIII-A-2. Admissions to and Graduations from Practical Nursing Educational Programs by Geographic Area: 1986-1987

Geographic Area	Admissions[1]	Graduations[1]
United States	42,452	27,285
New England	1,385	1,108
Connecticut	335	257
Maine	179	152
Massachusetts	758	541
New Hampshire	62	56
Rhode Island	0	45
Vermont	51	57
Middle Atlantic	6,146	3,994
New Jersey	1,278	814
New York	2,950	1,844
Pennsylvania	1,918	1,336
South Atlantic	7,256	4,258
Delaware	99	44
District of Columbia	159	61
Florida	2,212	1,374
Georgia	1,581	883
Maryland	261	175
North Carolina	569	329
South Carolina	544	321
Virginia	1,350	751
West Virginia	481	320
East South Central	3,841	2,452
Alabama	1,304	783
Kentucky	895	596
Mississippi	617	418
Tennessee	1,025	655
West South Central	6,940	4,274
Arkansas	755	625
Louisiana	1,383	763
Oklahoma	689	489
Texas	4,113	2,397
East North Central	5,660	4,011
Illinois	1,728	1,030
Indiana	932	669
Michigan	1,163	955
Ohio	1,640	1,215
Wisconsin	197	142
West North Central	4,485	2,608
Iowa	1,007	489
Kansas	646	469
Minnesota	1,213	718
Missouri	995	644
Nebraska	369	227
North Dakota	235	44
South Dakota	20	17
Mountain	1,832	1,270
Arizona	380	316
Colorado	466	269
Idaho	107	90
Montana	180	100
Nevada	56	43
New Mexico	242	152
Utah	289	233
Wyoming	112	67
Pacific	4,907	3,319
Alaska	0	0
California	3,372	2,207
Hawaii	109	63
Oregon	310	265
Washington	1,116	784

1/ Time period for academic year is August 1 through July 31.

SOURCE: National League for Nursing. Nursing Data Review, 1988.

Table VIII-A-3. Registered Nurse Population and Full-Time Equivalent Employed Registered Nurses by Geographic Area, March 1988

Geographic Area	Number in Sample	Total	Employed in Nursing		Not Employed in Nursing		RNs per 100,000 pop.[1]	FTE Registered Nurses	FTE RNs 100,000 pop.[1]
			Number	Percent	Number	Percent			
UNITED STATES	33,047	2,033,032	1,627,035	80.0	405,997	20.0	668	1,363,600	560
NEW ENGLAND	3,332	170,080	130,915	77.0	39,166	23.0	1,020	102,449	798
CONNECTICUT	526	39,550	29,367	74.3	10,183	25.7	916	23,072	719
MAINE	622	12,318	9,639	78.3	2,679	21.7	809	7,753	653
MASSACHUSETTS	789	87,694	68,255	77.8	19,439	22.2	1,167	53,173	908
NEW HAMPSHIRE	467	13,525	10,015	74.0	3,510	26.0	946	7,909	748
RHODE ISLAND	545	11,156	9,149	82.0	2,008	18.0	933	7,081	718
VERMONT	383	5,837	4,490	76.9	1,347	23.1	821	3,461	632
MIDDLE ATLANTIC	3,259	383,590	293,961	76.6	89,629	23.4	785	247,697	662
NEW JERSEY	613	73,321	53,239	72.6	20,082	27.4	693	43,526	567
NEW YORK	1,408	178,912	142,899	79.9	36,013	20.1	802	121,936	684
PENNSYLVANIA	1,238	131,357	97,823	74.5	33,534	25.5	819	82,235	689
SOUTH ATLANTIC	5,707	329,779	259,671	78.7	70,108	21.3	623	224,521	539
DELAWARE	403	6,860	5,661	82.5	1,199	17.5	885	4,665	724
DISTRICT OF COLUMBIA	349	10,928	10,279	94.1	649	5.9	1,656	9,042	1,454
FLORIDA	999	102,470	80,319	78.4	22,151	21.6	668	70,019	582
GEORGIA	725	41,873	33,860	80.9	8,012	19.1	545	29,414	473
MARYLAND	756	41,182	32,207	78.2	8,975	21.8	710	26,152	577
NORTH CAROLINA	646	47,647	37,568	78.8	10,080	21.2	586	33,879	528
SOUTH CAROLINA	638	19,249	15,180	78.9	4,069	21.1	444	13,651	399
VIRGINIA	682	45,865	33,500	73.0	12,365	27.0	567	28,012	474
WEST VIRGINIA	509	13,705	11,097	81.0	2,608	19.0	585	9,687	511
EAST SOUTH CENTRAL	2,363	97,925	82,644	84.4	15,281	15.6	540	73,585	481
ALABAMA	650	26,763	22,113	82.6	4,650	17.4	541	19,791	485
KENTUCKY	599	23,279	19,495	83.7	3,784	16.3	523	17,418	467
MISSISSIPPI	553	14,252	12,147	85.2	2,104	14.8	461	11,118	424
TENNESSEE	561	33,631	28,889	85.9	4,743	14.1	595	25,258	520
WEST SOUTH CENTRAL	2,641	157,744	125,470	79.5	32,275	20.5	466	113,243	421
ARKANSAS	492	14,394	11,292	78.4	3,102	21.6	473	9,966	417
LOUISIANA	556	23,625	19,685	83.3	3,941	16.7	442	18,115	406
OKLAHOMA	643	18,851	15,036	79.8	3,815	20.2	458	13,596	416
TEXAS	950	100,874	79,457	78.8	21,417	21.2	474	71,566	426
EAST NORTH CENTRAL	3,531	365,890	295,202	80.7	70,688	19.3	705	242,011	578
ILLINOIS	878	104,697	84,779	81.0	19,918	19.0	734	69,616	601
INDIANA	580	43,203	35,527	82.2	7,675	17.8	642	30,207	546
MICHIGAN	611	79,330	60,463	76.2	18,867	23.8	658	49,164	534
OHIO	937	97,258	80,095	82.4	17,163	17.6	743	66,075	613
WISCONSIN	525	41,402	34,338	82.9	7,065	17.1	714	26,949	561
WEST NORTH CENTRAL	4,327	159,622	135,464	84.9	24,157	15.1	768	111,096	630
IOWA	803	27,472	22,770	82.9	4,702	17.1	805	18,347	647
KANSAS	706	20,247	16,863	33.3	3,384	16.7	683	14,432	583
MINNESOTA	729	40,116	33,911	84.5	6,204	15.5	798	25,904	610
MISSOURI	598	45,102	38,277	84.9	6,825	15.1	751	33,113	649
NEBRASKA	605	13,536	11,627	85.9	1,909	14.1	728	9,475	594
NORTH DAKOTA	424	6,752	6,239	92.4	513	7.6	923	4,950	737
SOUTH DAKOTA	462	6,397	5,777	90.3	620	9.7	818	4,875	688
MOUNTAIN	4,195	101,036	81,838	81.0	19,200	19.0	623	68,581	521
ARIZONA	721	29,860	23,191	77.7	6,669	22.3	685	19,989	590
COLORADO	772	28,917	23,459	81.1	5,458	18.9	713	19,448	590
IDAHO	474	6,329	4,963	78.4	1,366	21.6	501	4,071	408
MONTANA	460	6,748	5,275	78.2	1,473	21.8	655	4,189	508
NEVADA	398	7,677	6,367	82.9	1,310	17.1	636	5,678	564
NEW MEXICO	466	9,180	7,489	81.6	1,691	18.4	500	6,230	415
UTAH	538	9,294	8,397	90.3	898.0	9.7	500	6,691	398
WYOMING	366	3,031	2,697	89.0	335	11.0	551	2,285	466
PACIFIC	3,692	267,362	221,869	82.9	45,495	17.1	607	179,617	492
ALASKA	340	4,243	3,351	79.0	892	21.0	648	2,815	536
CALIFORNIA	1,596	191,947	159,008	82.8	32,940	17.2	575	128,999	466
HAWAII	427	7,024	5,923	84.3	1,102	15.7	545	5,187	479
OREGON	600	23,477	20,466	87.2	3,011	12.8	753	16,155	593
WASHINGTON	729	40,671	33,121	81.4	7,550	18.6	729	26,461	583

Estimated number and percent may not add to total because of rounding.

1/ Population data used for RN population ratios are from U.S. Bureau of the Census, CURRENT POPULATION REPORTS, Series P-25, No. 1024. Issued May 1988.

SOURCE: Division of Nursing, BHPr, HRSA, USDHHS, National Sample Survey of Registered Nurses, March 1988. Unpublished data.

Table VIII-A-4. Projected Supply of Registered Nurses by Educational Preparation and Geographic Area, December 31, 2000

Geographic area	Total RNs	Associate degree & diploma	Bacca-laureate	Master's & doctoral	RNs per 100,000 population[1]
United States	1,912,600	1,010,980	695,600	206,050	713
New England	141,200	62,170	57,200	21,720	1,025
Connecticut	25,500	10,920	11,650	2,880	740
Maine	13,700	6,940	5,980	790	1,079
Massachusetts	73,200	30,980	26,070	16,100	1,202
New Hampshire	11,000	4,350	6,040	600	824
Rhode Island	9,900	6,290	3,100	470	944
Vermont	7,900	2,690	4,360	880	1,337
Middle Atlantic	324,100	165,960	123,350	34,860	852
New Jersey	60,500	28,390	25,080	7,040	801
New York	152,100	83,080	53,630	15,400	846
Pennsylvania	111,500	54,490	44,640	12,420	969
South Atlantic	337,100	191,910	113,920	31,210	674
Delaware	7,500	3,220	3,050	1,220	1,025
District of Columbia	9,400	3,410	5,100	860	1,483
Florida	105,200	67,230	32,180	5,800	683
Georgia	46,900	27,380	15,680	3,800	589
Maryland	41,300	21,190	16,000	4,140	784
North Carolina	54,900	29,020	18,910	6,970	734
South Carolina	19,400	10,630	6,570	2,180	497
Virginia	39,700	22,190	13,450	4,050	577
West Virginia	12,800	7,640	2,980	2,190	743
East South Central	94,200	61,410	24,610	8,250	579
Alabama	26,900	15,590	8,040	3,280	610
Kentucky	18,500	12,920	4,760	840	496
Mississippi	15,000	8,720	3,900	2,430	521
Tennessee	33,800	24,180	7,910	1,700	642
West South Central	138,200	72,320	51,080	14,790	451
Arkansas	14,900	9,180	4,970	730	589
Louisiana	16,100	8,800	5,840	1,460	357
Oklahoma	15,900	7,600	6,270	2,020	471
Texas	91,300	46,740	34,000	10,580	452
East North Central	337,800	181,230	116,670	39,900	809
Illinois	85,400	44,280	29,900	11,230	737
Indiana	47,000	23,100	16,540	7,370	854
Michigan	77,340	43,260	25,380	8,710	836
Ohio	90,260	50,250	29,540	10,480	849
Wisconsin	37,800	20,340	15,310	2,110	791
West North Central	162,810	81,780	66,810	14,130	912
Iowa	26,300	15,870	9,180	1,230	1,032
Kansas	22,310	11,940	8,750	1,620	884
Minnesota	37,900	19,260	13,280	5,330	844
Missouri	45,700	21,250	21,130	3,350	848
Nebraska	17,000	7,260	8,150	1,550	1,093
North Dakota	7,100	2,800	3,800	470	1,129
South Dakota	6,500	3,400	2,520	580	912
Mountain	97,351	49,220	39,710	8,370	608
Arizona	27,300	14,460	9,380	3,450	592
Colorado	22,851	10,920	9,220	2,720	599
Idaho	6,600	3,490	2,680	420	629
Montana	5,600	3,020	2,430	90	707
Nevada	15,000	8,420	6,390	210	1,153
New Mexico	7,300	3,670	3,390	240	371
Utah	9,400	3,860	4,660	870	472
Wyoming	3,300	1,380	1,560	370	673
Pacific	280,000	144,990	102,280	32,860	645
Alaska	1,600	520	920	190	233
California	199,700	105,720	70,380	23,640	596
Hawaii	6,200	2,780	3,170	270	460
Oregon	24,300	13,800	8,780	1,720	846
Washington	48,200	22,170	19,030	7,040	965

Estimated numbers may not add to total because of rounding.

1/ Census-based projections of population by Office of Data Analysis Management, BHPr, HRSA, USDHHS, 1989.

SOURCE: Projections by Division of Nursing, BHPr, HRSA, USDHHS, 1989.

Table VIII-A-5. Projected Full-Time Equivalent Supply of Registered Nurses by Educational Preparation and Geographic Area, December 31, 2000

Geographic area	Total FTE RNs	Associate degree & diploma	Bacca-laureate	Master's & doctoral	FTE RNs per 100,000 pop.[1]
United States	1,623,600	847,740	590,710	185,170	606
New England	112,300	45,930	42,170	18,110	815
Connecticut	20,500	8,490	9,490	2,570	595
Maine	11,300	5,510	5,060	750	890
Massachusetts	57,700	23,810	20,080	13,860	948
New Hampshire	9,100	3,380	5,190	500	682
Rhode Island	7,500	4,740	2,350	430	715
Vermont	6,200				1,049
Middle Atlantic	277,200	139,660	106,500	31,040	729
New Jersey	49,000	23,160	20,610	5,260	573
New York	132,500	70,970	47,020	14,520	737
Pennsylvania	95,700	45,530	38,870	11,260	832
South Atlantic	293,670	166,550	98,780	28,390	587
Delaware	6,400	2,580	2,630	1,200	874
District of Columbia	8,400	3,020	4,580	770	1,325
Florida	92,700	59,690	27,560	5,460	601
Georgia	41,270	23,900	13,970	3,390	519
Maryland	33,500	16,520	13,380	3,630	636
North Carolina	49,800	26,130	17,440	6,250	666
South Carolina	17,300	9,550	5,890	1,860	443
Virginia	32,900	18,570	10,700	3,650	478
West Virginia	11,400	6,590	2,630	2,180	662
East South Central	84,600	55,190	21,840	7,480	520
Alabama	24,100	13,900	7,200	2,950	547
Kentucky	16,600	11,590	4,290	720	445
Mississippi	14,000	8,040	3,650	2,320	487
Tennessee	29,900	21,660	6,700	1,490	568
West South Central	126,500	65,600	46,740	14,210	413
Arkansas	13,300	8,370	4,300	660	526
Louisiana	15,000	7,930	5,600	1,450	332
Oklahoma	14,400	6,900	5,720	1,770	427
Texas	83,800	42,400	31,120	10,330	415
East North Central	281,600	148,270	98,150	35,350	675
Illinois	71,300	36,780	24,720	9,850	616
Indiana	41,200	19,560	14,790	6,880	749
Michigan	64,100	35,140	21,480	7,520	693
Ohio	75,300	40,940	25,180	9,190	708
Wisconsin	29,700	15,850	11,980	1,910	621
West North Central	134,800	66,470	55,660	12,640	755
Iowa	21,100	12,570	7,400	1,120	828
Kansas	19,100	10,380	7,280	1,440	756
Minnesota	29,000	14,430	10,090	4,460	646
Missouri	40,200	18,400	18,560	3,240	746
Nebraska	14,200	5,790	6,950	1,460	913
North Dakota	5,700	2,150	3,060	450	906
South Dakota	5,500	2,750	2,320	470	771
Mountain	83,000	41,500	33,910	7,510	518
Arizona	23,900	12,460	8,240	3,220	518
Colorado	19,200	9,030	7,860	2,300	504
Idaho	5,400	2,870	2,130	390	514
Montana	4,400	2,410	1,880	90	556
Nevada	13,500	7,510	5,770	200	1,038
New Mexico	6,200	3,030	2,890	230	315
Utah	7,600	3,020	3,790	750	382
Wyoming	2,800	1,170	1,350	330	571
Pacific	229,800	116,470	83,680	29,640	529
Alaska	1,400	430	760	190	203
California	163,700	84,980	57,530	21,210	489
Hawaii	5,500	2,470	2,750	260	408
Oregon	19,600	10,870	7,090	1,630	682
Washington	39,600	17,720	15,550	6,350	793

Estimated numbers may not add to total because of rounding.

1/ Census-based projections of population by Office of Data Analysis Management, BHPr,HRSA, USDHHS, 1989

Table VIII-A-6. Projected Requirements for for Full-Time Equivalent Registered Nurses from Historical Trend-Based Model, 2000

Geographic area	Registered nurses	Geographic area	Registered nurses
United States	1,967,000		
New England	130,060	East North Central	362,240
Connecticut	31,350	Illinois	108,820
Maine	10,440	Indiana	42,300
Massachusetts	63,920	Michigan	75,420
New Hampshire	10,270	Ohio	95,150
Rhode Island	8,740	Wisconsin	40,550
Vermont	5,340		
		West North Central	159,420
Middle Atlantic	372,090	Iowa	25,480
New Jersey	62,150	Kansas	19,620
New York	188,480	Minnesota	41,940
Pennsylvania	121,460	Missouri	46,650
		Nebraska	11,990
South Atlantic	319,610	North Dakota	6,270
Delaware	5,580	South Dakota	7,470
District of Columbia	11,770		
Florida	94,720	Mountain	99,990
Georgia	46,180	Arizona	29,930
Maryland	34,010	Colorado	25,830
North Carolina	49,500	Idaho	6,170
South Carolina	19,900	Montana	9,670
Virginia	41,430	Nevada	7,330
West Virginia	16,520	New Mexico	8,400
		Utah	8,700
East South Central	120,710	Wyoming	3,960
Alabama	29,550		
Kentucky	26,390	Pacific	231,600
Mississippi	20,790	Alaska	3,920
Tennessee	43,980	California	162,270
		Hawaii	6,670
West South Central	171,280	Oregon	23,640
Arkansas	16,130	Washington	35,100
Louisiana	29,220		
Oklahoma	19,250		
Texas	106,680		

Estimated numbers may not add to total because of rounding.

SOURCE: Projections by Division of Nursing, BHPr, HRSA, USDHHS, 1989.

Table VIII-A-7. Projected Requirements for Full-Time Equivalent Registered Nurses from Criteria-Based Model, by Geographic Area and Educational Preparation, 2000

Geographic area	Total	Lower Bound			
		Associate degeee & diploma	Bacca-laureate	Master's	Doctorate
United States	2,102,000	691,540	1,018,700	363,790	27,970
New England	118,850	39,900	57,340	20,040	1,570
Connecticut	26,940	8,990	12,940	4,600	410
Maine	11,360	3,850	5,520	1,840	150
Massachusetts	58,430	19,800	28,180	9,750	700
New Hampshire	7,730	2,400	3,750	1,470	110
Rhode Island	8,900	3,060	4,300	1,390	150
Vermont	5,490	1,800	2,650	990	50
Middle Atlantic	137,000	45,560	66,670	22,800	3,040
New Jersey	66,180	22,320	31,990	11,060	810
New York	160,820	55,530	77,800	25,200	2,290
Pennsylvania	118,130	40,380	57,220	18,400	2,130
South Atlantic	354,270	116,550	171,600	62,430	4,690
Delaware	4,800	1,580	2,320	770	130
District of Columbia	10,730	3,890	5,180	1,520	140
Florida	110,260	35,890	53,320	20,860	1,190
Georgia	51,290	16,840	24,950	9,040	460
Maryland	37,880	12,440	18,220	6,760	460
North Carolina	50,820	16,790	24,610	8,760	660
South Carolina	24,760	8,060	12,070	4,220	410
Virginia	44,930	14,660	21,730	7,540	1,000
West Virginia	18,800	6,400	9,200	2,960	240
East South Central	137,000	45,560	66,670	22,800	3,040
Alabama	36,020	12,000	17,500	5,850	650
Kentucky	32,070	10,450	15,600	5,430	590
Mississippi	22,190	7,380	10,840	3,850	1,210
Tennessee	46,720	15,730	22,730	7,670	590
West South Central	213,800	68,070	104,320	38,570	2,840
Arkansas	20,480	6,770	9,930	3,540	240
Louisiana	35,510	11,440	17,360	6,130	580
Oklahoma	26,120	8,330	12,660	4,790	340
Texas	131,690	41,530	64,370	24,110	1,680
East North Central	379,440	126,890	184,160	62,840	5,540
Illinois	108,530	36,500	52,570	18,200	1,260
Indiana	46,540	15,330	22,630	7,530	1,050
Michigan	78,050	25,890	38,000	13,200	950
Ohio	100,070	33,710	48,590	16,280	1,490
Wisconsin	46,250	15,460	22,370	7,630	790
West North Central	174,840	58,980	84,530	28,350	2,940
Iowa	26,820	9,040	13,000	4,400	340
Kansas	22,300	7,350	10,780	3,700	470
Minnesota	43,650	14,710	21,000	7,610	330
Missouri	51,760	17,590	25,090	8,500	580
Nebraska	16,140	5,460	7,800	1,910	970
North Dakota	6,840	2,330	3,310	1,070	130
South Dakota	7,330	2,500	3,550	1,160	120
Mountain	102,230	31,210	49,880	19,890	1,240
Arizona	27,980	8,650	13,640	5,400	280
Colorado	26,650	8,360	12,980	5,050	260
Idaho	7,330	2,190	3,600	1,470	70
Montana	8,040	2,680	3,900	1,360	100
Nevada	6,750	1,950	3,290	1,410	100
New Mexico	10,340	3,110	4,990	2,110	130
Utah	10,920	3,000	5,400	2,280	240
Wyoming	4,220	1,270	2,080	810	60
Pacific	276,460	86,100	133,440	54,000	2,920
Alaska	3,020	890	1,490	590	50
California	206,070	64,200	99,340	40,430	2,100
Hawaii	8,970	2,830	4,340	1,720	80
Oregon	22,860	7,060	11,070	4,410	320
Washington	35,540	11,120	17,200	6,850	370

Estimated numbers may not add to total because of rounding.

Table VIII-A-8. Projected Requirements for Full-Time Equivalent Registered Nurses from Criteria-Based Model, by Geographic Area and Educational Preparation, 2000 (continued)

Geographic area	Total	Associate degree & diploma	Upper Bound		
			Bacca-laureate	Master's	Doctorate
United States	2,657,800	703,760	1,326,320	586,170	41,550
New England	151,010	40,950	74,610	33,080	2,370
Connecticut	34,450	9,380	16,850	7,610	610
Maine	14,310	3,880	7,140	3,080	210
Massachusetts	74,190	20,200	36,770	16,160	1,060
New Hampshire	9,820	2,510	4,810	2,310	190
Rhode Island	11,330	3,160	5,580	2,370	220
Vermont	6,910	1,820	3,460	1,550	80
Middle Atlantic	438,820	118,310	220,260	92,930	7,320
New Jersey	84,130	22,550	42,000	18,380	1,200
New York	205,000	55,200	103,280	43,320	3,200
Pennsylvania	149,690	40,560	74,980	31,230	2,920
South Atlantic	448,520	119,080	222,970	100,930	7,230
Delaware	6,160	1,650	3,000	3,020	180
District of Columbia	13,710	3,790	6,960	2,770	190
Florida	138,740	37,130	68,710	30,950	1,950
Georgia	64,860	17,040	32,430	14,630	760
Maryland	48,620	12,890	23,890	11,110	730
North Carolina	64,230	17,160	31,930	14,140	1,000
South Carolina	31,300	8,210	15,600	6,870	620
Virginia	57,210	15,000	28,360	12,380	1,470
West Virginia	23,690	6,210	12,090	5,060	330
East South Central	172,110	45,450	86,970	36,650	3,040
Alabama	45,240	12,060	22,820	9,420	940
Kentucky	40,260	10,520	20,280	8,630	830
Mississippi	27,640	7,270	14,080	5,910	380
Tennessee	58,970	15,600	29,790	12,690	890
West South Central	267,650	69,300	134,290	59,670	4,390
Arkansas	25,600	6,920	12,800	5,500	380
Louisiana	44,560	11,490	22,430	9,780	860
Oklahoma	32,690	8,630	16,260	7,250	550
Texas	164,800	42,260	82,800	37,140	2,600
East North Central	478,220	127,850	240,180	102,080	8,110
Illinois	137,080	36,670	68,950	29,550	1,910
Indiana	58,410	15,560	29,250	12,160	1,440
Michigan	98,380	26,060	49,390	21,490	1,440
Ohio	126,320	33,770	63,560	26,810	2,180
Wisconsin	58,030	15,790	29,030	12,070	1,140
West North Central	219,080	59,720	109,990	46,150	3,210
Iowa	33,380	9,220	16,750	6,910	500
Kansas	28,000	7,550	13,940	5,830	680
Minnesota	55,010	15,000	27,450	12,010	540
Missouri	64,980	17,580	32,800	13,740	860
Nebraska	20,120	5,530	10,130	4,190	270
North Dakota	8,590	2,370	4,300	1,720	200
South Dakota	9,000	2,470	4,620	1,750	160
Mountain	129,140	32,320	64,030	30,590	2,000
Arizona	35,270	9,020	17,460	8,320	470
Colorado	33,710	8,580	16,780	7,930	420
Idaho	9,120	2,250	4,580	2,180	110
Montana	10,040	2,640	5,100	2,160	140
Nevada	8,680	2,080	4,190	2,240	170
New Mexico	13,320	3,320	6,430	3,250	220
Utah	13,800	3,180	6,830	3,320	370
Wyoming	5,200	1,250	2,660	1,190	100
Pacific	353,310	90,420	173,010	85,270	4,610
Alaska	3,750	900	1,890	890	70
California	264,280	67,490	129,110	64,320	3,360
Hawaii	11,420	2,970	5,620	2,700	130
Oregon	28,960	7,390	14,250	6,840	480
Washington	44,900	11,670	22,140	10,520	570

Estimated numbers may not add to total because of rounding.

Source: Projections by Division of Nursing, BHPr, HRSA, USDHHS, 1989.

Table VIII-A-9. Projected Requirements for Full-Time Equivalent Licensed Practical/Vocational Nurses and Nursing Aides, from Criteria-Based Model, 2000

Geographic area	LPN/VNs Lower bound	 Upper bound	Aides Lower bound	 Upper bound
United States	345,500	343,000	1,395,700	1,685,200
New England	21,110	21,190	86,840	101,640
Connecticut	5,030	5,110	20,600	24,140
Maine	2,120	2,130	8,190	9,560
Massachusetts	10,040	10,000	41,950	48,820
New Hampshire	1,300	1,310	5,730	6,980
Rhode Island	1,710	1,750	6,710	7,740
Vermont	910	890	3,660	4,400
Middle Atlantic	52,770	51,090	209,130	250,330
New Jersey	9,840	9,590	41,270	49,620
New York	24,290	23,260	91,660	110,710
Pennsylvania	18,640	18,240	76,200	90,000
South Atlantic	58,310	58,210	237,530	286,350
Delaware	790	800	3,320	3,970
District of Columbia	1,000	860	4,410	5,210
Florida	22,000	22,470	84,480	100,780
Georgia	7,970	7,870	32,860	40,030
Maryland	5,420	5,350	24,200	29,220
North Carolina	8,630	8,660	35,090	41,990
South Carolina	3,750	3,740	15,960	19,440
Virginia	6,490	6,370	28,100	34,360
West Virginia	2,260	2,090	9,110	11,350
East South Central	20,860	20,340	83,740	102,160
Alabama	5,610	5,520	22,470	27,160
Kentucky	5,160	5,080	20,510	25,160
Mississippi	3,440	3,340	14,050	17,140
Tennessee	6,650	6,400	26,710	32,700
West South Central	35,450	35,410	146,190	179,360
Arkansas	4,270	4,360	15,730	18,660
Louisiana	5,290	5,180	22,950	28,310
Oklahoma	5,100	5,200	19,910	23,910
Texas	20,790	20,670	87,600	108,480
East North Central	685,190	620,410	556,340	303,050
Illinois	17,740	17,380	69,080	83,000
Indiana	8,330	8,350	33,410	39,870
Michigan	13,100	12,930	51,930	62,350
Ohio	16,300	16,000	63,490	76,240
Wisconsin	9,310	9,410	35,380	41,590
West North Central	33,820	33,970	125,540	147,370
Iowa	6,030	6,160	21,920	25,390
Kansas	4,350	4,410	16,490	19,370
Minnesota	8,310	8,340	31,620	37,170
Missouri	8,930	8,810	33,570	39,870
Nebraska	3,340	3,370	11,900	13,860
North Dakota	1,290	1,310	4,660	5,440
South Dakota	1,570	1,570	5,380	6,270
Mountain	14,670	14,610	66,130	83,440
Arizona	4,540	4,610	19,380	24,110
Colorado	3,710	3,650	16,330	20,420
Idaho	1,200	1,200	5,240	6,600
Montana	1,240	1,200	4,640	5,600
Nevada	720	720	3,990	5,240
New Mexico	1,480	1,490	6,940	8,640
Utah	1,350	1,340	7,210	9,690
Wyoming	430	400	2,400	3,140
Pacific	43,880	44,190	186,460	230,440
Alaska	320	300	1,680	2,210
California	31,450	31,560	135,510	167,930
Hawaii	1,440	1,460	5,840	7,100
Oregon	3,880	3,930	16,230	20,070
Washington	6,790	6,940	27,200	33,130

Estimated numbers may not add to total because of rounding.

SOURCE: Projections by Division of Nursing, BHPr, HRSA, USDHHS, 1989.

Chapter IX

PUBLIC HEALTH

Introduction

Significant public health manpower concerns were discussed in chapter IV-F. This chapter presents data on educational developments, supply, and needs for major categories of public health personnel including environmental health personnel and health educators.

The Institute of Medicine's (IOM) study The Future of Public Health states that organized community efforts to prevent disease and promote health are valuable and effective (NAS, 1988). Yet, public health activities in the United States have been taken for granted and are in "disarray." The IOM report discusses the need for well-trained public health professionals and delineates a number of problems that currently exist in meeting this need. The Bureau of Health Professions and The Centers for Disease Control have jointly funded a project that will respond to concerns in the IOM report that education in schools of public health is not adequately preparing students for practice in public agencies. The project will allow educators, employers, and practitioners to participate in a series of work groups to develop action steps for making education more relevant to practice.

Previous reports to Congress have concluded that there are shortages of personnel in several specialties in public health and that the need for these personnel will grow due to several major trends:

- *Concern over degradation of the environment is growing, including indoor and outdoor air pollution, hazardous waste disposal, and safety of the water supply.*
- *Behavior-related disorders have become widespread and are drawing attention. Substance abuse, unintentional injuries, and early pregnancy problems continue to plague children and young adults.*

- *New generations of infectious diseases -- most notably acquired immune deficiency syndrome (AIDS), but also legionnaires' disease, toxic shock syndrome, and others -- require surveillance, intervention, education, and research. It is expected that HIV/AIDS will be a major burden on the Nation's public health agencies. Because of the low probability of an early effective cure, HIV/AIDS education and preventive strategies are the most effective public health measures. HIV/AIDS education must be provided to public health and health care professionals to develop the skills required to diagnose and prevent spread of HIV/AIDS viruses.*

- *Special population groups such as the elderly, poor, disadvantaged, and rural, migrant, and immigrant populations face difficult access and costly health problems.*

- *Among the highest priorities are ensuring a healthy start in life for infants and enhancing the health of their mothers through focused health promotion activities.*

Supply of Public Health Professionals

Current supply of public health professionals is estimated to be 220,000 with 280,000 other professionals also providing public health services (table IX-1). The supply of professionals and their adequacy in three fields will be discussed: environmental health, health education, and public health dentistry.

Table IX-1

Supply of Public Health Professionals, 1989

Specialty	Public Health Professionals	Other Professionals
Environmental and Occupational Health (DHHS,1988b)	80,000	155,000
Public Health Nurses (DHHS,1984c)	50,000	65,000
Health Services Administrators (DHHS,1984b)	45,000	40,000
Health Educators (DHHS,1982)	21,000	4,000
Public Health Nutritionists (Moore,1985)(Kaufman,1986)	6,000	4,000
Epidemiologists (Williams,1985)	3,400	1,200
Biostatisticians (DHHS,1982)	3,000	500
Others	11,600	10,300
	220,000	280,000

Source: Estimates prepared by the Public Health Professions Branch, Bureau of Health Professions, Health Resources and Services Administration, Public Health Service, Department of Health and Human Services, 1989.

Environmental Health

The Sixth Report to the President and Congress on the Status of Health Personnel in the United States discussed in detail available information on the education and utilization of environmental and occupational health personnel. Reports and studies were presented by the Environmental Protection Agency, National Academy of Sciences, National Environmental Health Association, American Industrial Hygiene Association, National Institute of Environmental Health Sciences, and others. To help close the information gap, Bureau of Health Professions funded a study and workshop to evaluate supply and demand and need for environmental health personnel (DHHS,1988b). Workshop participants represented a broad spectrum of environmental health areas and all levels of government, private industry, academia, and professional associations. According to available data and estimates made by workshop participants, there were approximately 235,000 professionals providing environmental health services in 1987 (table IX-2).

Only about 80,000 have formal education in environmental health sciences and can be called environmental health professionals. Another 155,000 were professionals with relevant skills, such as engineers and chemists, who were engaged in environmental health activities, but who have no training in environmental public health. There were also about 480,000 technicians and operators for a total work force of 715,000.

Table IX-2

Environmental Health Professionals, 1987

Specialty	Professionals Environmental Public Health	Other
Air Quality Workers	4,000	14,000
Water Quality Personnel	16,000	70,000
Milk/Food Sanitarians	8,000	2,000
Institutional Health	5,000	21,000
Env. Epi/Env. Tox	3,500	0
Hazardous Materials Mgrs.	300	9,700
Industrial Hygienists	11,000	0
Occup. Health/Safety	25,000	33,000
Land Use/Housing/Vector	4,000	4,000
Solid Waste Managers	1,000	1,000
Injury Control Workers	100	300
Academicians	2,100	0
	80,000	155,000

Source: DHHS, 1988b.

There are large shortages of environmental and occupational health personnel. Of the 235,000 professionals in the 1987 work force about 40,000 needed additional training and 120,000 additional individuals are needed in the work force (table IX-3).

Most environmental programs involve administration of environmental laws. Thus, a large portion of the personnel are employed in government agencies. Practitioners are also employed by industry, educational institutions, consulting firms, and other parts of the private sector. Even though all sectors of society should be concerned about environmental work force problems, workshop participants concluded that protection of the environment is primarily the responsibility of all levels of government. They recommended that the U.S. Public Health Service take the lead in developing a plan " to delineate the necessary training and education of the work force...." In response to this recommendation the Bureau of Health Professions sponsored an "Environmental Health Faculty/Employer Forum" and an analysis of a survey of environmental health staff in State and local health departments. A brief summary of these projects follows.

Table IX-3

Needs for Environmental Health Professionals, 1987

Specialty	Professionals Need Additional Training	 Additional Individuals Needed
Air Quality Workers	0	0
Water Quality Personnel	0	16,500
Milk/Food Sanitarians	500	7,000
Institutional Health	5,500	10,000
Env. Epi/Env. Tox	0	500
Hazardous Materials Mgrs.	5,000	65,000
Industrial Hygienists	0	2,500
Occup. Health/Safety	25,000	0
Land Use/Housing/Vector	1,000	11,000
Solid Waste Managers	500	3,500
Injury Control Workers	0	5,000
Academicians	0	200
	37,500	121,200

Source: DHHS, 1988b.

The "Environmental Health Faculty/Employer Forum" was convened in Ann Arbor, Michigan on May 1-4, 1988 (DHHS,1989a). Workshop participants included academicians, representatives from all levels of government, industry and other private sector employers. Experts at the Forum concluded that academic institutions educating environmental health professionals face a crisis in student recruitment, curricula, and relevance of their programs to community needs. Among difficulties identified were:

- *Shortcomings in communication, decision making, leadership, and management;*
- *Students who are not learning to think creatively and solve problems;*
- *Lack of resources for training and technology transfer;*
- *Faculty having difficulty in keeping up with the state of the art of the profession; and*
- *Continuing education activities that have not developed a public health perspective, especially in dealing with multiple systems and health effects.*

Many of the problems are related to defining the scope of the profession including essential competencies and quality measures. Workshop participants urged academic, professional, and employer groups to convene an ongoing coordinating group to consider improvements in undergraduate, graduate, and continuing education in the hope that such a council would facilitate agreement on roles, responsibilities, and education for environmental health personnel.

During 1987 the National Environmental Health Association conducted a survey of State and local health department staff (NEHA,1989). Responses were received from 30 State agencies including four that provided data on all the local departments in their States, and from 931 other local health departments.

Responding State health departments reported employing 5,230 environmental health personnel of whom 1,114 were registered sanitarians. Environmental health and environmental protection responsibilities are often split between two or more State agencies. Because this survey covered only health agencies, it did not identify the total environmental health work force at the State level.

The response from local agencies was found to be representative of the country as a whole. Local health departments reported 10,656 employees in environmental health programs. Seventy-four percent of local agencies are small, employing 10 or fewer environmental health staff -- 35 percent have two or less. Local health agencies also reported 397 vacancies, a vacancy rate of 5.3 percent. They employed 4,656 registered sanitarians, about 44 percent of all environmental health employees. Per capita expenditures in the regions ranged from $2.20 to $3.82 with an average of $2.74. There was an average of one local environmental employee per 13,600 population, and an estimated 20,000 total environmental health staff in local health departments nationwide.

Health Education

Since 1978 a series of studies and other activities have been conducted on educational preparation, roles and functions, and need for health education specialists (health educators). With establishment of the National Commission for Health Education Credentialing, Inc. in 1988, a national voluntary professional credentialing system was created. As of May 1989 approximately 1,000 persons had received charter certification. Basic information has also been obtained by the commission on about 200 educational programs, and plans are underway to further strengthen professional health education programs and to develop a system for continued professional development.

Public Health Dentistry

The role of dental public health specialists is increasing (Lotskar,1985). In addition to the traditional role in public agencies, public health dentists are becoming more involved in school and workplace programs. They also are involved in development of government programs to provide dental benefits for the elderly and indigent and to diminish cultural and psychological barriers to care (ADA,1983). In 1988 there were 137 certified public health dentists. The American Association of Dental Schools estimated a need for 156 public health dentists in 1985, 211 in 1990, 262 in 1995, and 304 by 2000 (AADS,1980). In 1985 only 16 percent of State dental directors and 6 percent of the directors of city and county units were filled by board certified public health dentists (Lotskar,1985). Thus, many of the dentists serving in public agencies have not received basic preparation in public health principles.

Educational Developments

There are 24 accredited schools of public health. The schools, located in 8 private and 16 public universities, have a combined enrollment of more than 10,000 students, and employ more than 1,400 faculty members (ASPH,1989). They graduated more than 3,400 students in 1987-88.

Trends reported in the previous report to Congress remain essentially the same:

- *Applications, after remaining constant at about 10,000 from 1982-83 through 1985-86, increased to more than 11,000 in 1987-88.*

- *Enrollments continue to grow (10,761 in 1987-88).*

- *The current student body is 60 percent female, 16 percent foreign, and of U.S. students 19 percent are minorities.*

- *Two-thirds of students are enrolled in four program areas--health services administration (28 percent), epidemiology (15 percent), environmental sciences (13 percent), and behavioral sciences (10 percent).*

- *Nearly one-third of students are enrolled part-time.*

- *About 27 percent of the U.S. graduates in 1986-87 were physicians, dentists, and nurses.*

- *Expenditures by the 24 schools totaled $426 million in 1987-88 with 40 percent from federal sources (down from 55 percent in 1974-75).*

A survey was conducted by the Association of Schools of Public Health of graduates of the 24 schools of public health in 1986 (Magee,1987). Key findings, with comparisons to surveys in 1978 (Hall,1982) and 1981 (Licwinko,1982), are summarized below:

- *The median age of graduates is 31.*

- *Of 1,610 U.S. graduates who responded, 82 percent were employed, 12 percent were enrolled in an educational program, and 103 or 6.4 percent were unemployed (21 of these were not seeking employment). Unemployment rates were 6.5 percent in 1978 and 9.3 percent in 1981.*

- *About 25 percent of graduates return to their previous employer.*

- *The largest employer of graduates continues to be hospitals (19 percent), followed by universities (17 percent), State and local health departments (14 percent), and federal agencies (10 percent).*

- *There continues to be a slight decrease in government sponsored employment -- 52 percent in 1978, 50 percent in 1981, and 47 percent in 1986.*

- *Salary levels of recent graduates continue to increase, from a median of $21,600 in 1981 to $28,000 in 1986.*

- *The 1986 graduates had significantly less traineeship support and relied more on full-time jobs, loans, and personal savings to finance their education. Those receiving U.S.Public Health Service traineeships fell from 49 percent in 1981 to 31 percent in 1986.*

- *One-third of all graduates had an advanced degree prior to entering a school of public health.*

- *Nearly 60 percent of graduates had more than three years health-related work experience.*

- *A large majority of graduates found employment in their specialty soon after graduation.*

Schools of public health continue to report a shortage of qualified faculty, especially physicians, but also environmental epidemiologists, toxicologists, nutritionists, nurses, industrial hygienists, mathematical statisticians, and computer specialists. Salary differentials between universities and industry suggest that recruitment problems will continue unless career development incentives are provided to faculty.

In 1986-87, 59 graduate health services administration education programs were members of the Association of University Programs in Health Administration (AUPHA) including 11 in schools of public of health, 5 in Canadian programs, and 9 unaccredited programs. Fifty were accredited by the Accrediting Commission on Education for Health Services Administration. Thirty-seven were located in public and 22 in private institutions (AUPHA, 1988). Key trends in these programs are listed below:

- *Enrollment in master's level programs peaked at about 5,700 in the late 1970s and early 1980s and then began to decline. In recent years the enrollment level has been about 4,500 to 4,700 students per year (4,572 in 1986-87).*

- *Women have comprised over 50 percent of the student body since 1980 and were nearly 62 percent of the enrollment in 1986-87.*

- *In the last five years the number of graduates has ranged from 1,489 to 1,797, and averaged 1,630.*

- *Minority enrollment in graduate programs in 1986-87 was 10.5 percent, down from 15.4 percent in the peak enrollment year of 1979.*

- *In 1986-87, 45.3 percent of graduate level students were part-time.*

Schools of Public Health have received an authority for capitation support under Section 770 of the PHS Act since 1959 and traineeship support for students since 1957 under Section 792. Capitation support has remained between $5 and $6 million since 1970; traineeships were funded for $7 to $9 million between 1970 and 1981, decreasing to about $3 million since 1982.

Total support from the Bureau of Health Professions to schools of public health for Fiscal Years 1979-1988 was approximately $112 million (DHHS, 1988c). With passage of the Health Omnibus Programs Extension of 1988 contained in P.L. 100-607, institutional support will be phased out by 1991 and replaced by an authority for special project grants.

Accredited graduate programs in health administration have received institutional support (Section 791 of the PHS Act) and traineeship support for students (Section 791A) since 1978. Institutional support began at $3 million annually for three years and has been at about $1.5 million since 1982; traineeships began at $1.5 million per year and have been at about $500,000 since 1982.

Key information on support provided by these grant programs is given below.

- *About 1,900 students per year have received traineeships in recent years; about 50 percent of these, in health administration; more than 100 students per year have received traineeships to study epidemiology, environmental health, and health education.*

- *Average award per student in public health has been about $2,000 and about $1,300 in health administration.*

Public Health Personnel Problems

Shortages of personnel are likely for several of the public health specialists: epidemiologists, biostatisticians, several of the environmental and occupational health specialists, public health nurses, public health nutritionists, and physicians trained in public health and preventive medicine. The last four Reports to Congress have documented the available information relative to these shortages and several new studies are presented in this report. However, supply and requirements for public health personnel have not been analyzed as precisely as those for other health professionals. Methods for collecting this information have been developed, but the private sector has been reluctant to conduct the necessary data collection activities due to high costs and lack of resources (DHHS,1988a).

The Bureau of Health Professions is currently working with the American Public Health Association, Association of Schools of Public Health, National Association of County Health Officials, Public Health Foundation, and several public health specialty societies to develop joint efforts to resolve the lack of data on public health professionals. A steering committee has been working during the last year to develop recommendations for solving these data problems (DHHS, 1989). Their report contains the following key recommendations:

- *More systematic and useful data collection is needed to determine the extent to which the continuing problems in public health are related with the workforce.*

- *The Consortium developed an analytical system with two purposes: (1) to count and analyze, in a systematic and incremental manner, the public health workforce and (2) to consider the workforce implications inherent in addressing specific public health problems and objectives.*

- *They also recommend the establishment of an ongoing Consortium made-up initially of six professional associations and two Federal agencies. A framework for the new organization was established by the Steering Committee, including goals, objectives, and organizational structure. It was recommended that the American Public Health Association convene the initial consortium meeting and that the Federal Government exercise leadership in securing resources to develop and sustain the analytical system.*

Conclusions and Recommendations

Although adequate information on the public health work force does not exist, information obtained from experts attending workshops and the limited data that are available suggests there is a shortage of public health professionals and a growing crises in public health education. The following recommendations are made to solve these problems:

1. Obtain better data on public health personnel through joint Federal/State and local government efforts, including professional associations that represent the agencies.

2. Conduct studies in order to develop methods for making education of public health professionals more relevant to practice in public agencies.

3. Enrollment in schools of public health and other graduate programs in public health should be increased to alleviate shortages in certain specialties.

4. Schools of public health, departments of preventive medicine, and other educational programs should intensify recruitment efforts to attract physicians, scientists, engineers, and minorities to careers in public health.

5. More health professionals need skills in health promotion and disease prevention. In order to increase the numbers with these skills, health professions faculty, curriculum, student selection, accreditation, and certification standards must all be modified.

6. Education for public health professionals must include more emphasis on HIV/AIDS, substance abuse, and geriatrics.

7. Since there are large shortages of certain environmental health personnel as well as an educational system that needs improving, a national plan for the education of a new cadre of environmental public health specialists is needed.

8. Continuing education activities and support for current public health professionals to obtain additional education should be provided.

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Chapter X

ALLIED HEALTH

Introduction

Chapter IV-E of this report discussed major allied health manpower concerns. This chapter presents a detailed analysis of allied health supply and education.

There is no universally accepted definition of allied health. The Committee on Allied Health Education and Accreditation of the American Medical Association (CAHEA), which accredits nearly 3,000 education programs, defines allied health practitioners as a "large cluster of health care related professions and personnel whose functions include assisting, facilitating, or complementing the work of physicians and other specialists in the health care system, and who chose to be identified as allied health personnel." CAHEA points out that definitions of allied health vary due to the changing nature of the field, the differing perspectives of those who attempt to define it and because certain medically related occupations prefer identities independent of allied health.

The current legislative definition, contained in section 701 of Title VII of the Public Health Service Act, identifies an allied health professional as a health professional who:

> (1) Has received a certificate, an associate's degree, a bachelor's degree, a master's degree, a doctoral degree, or postbaccalaureate training, in a science relating to health care;
>
> (2) shares responsibility for delivery of health services or related services, including services relating to identification, evaluation, and prevention of disease and disorders; dietary and nutrition services; health promotion services, rehabilitation services; or health systems management services; and
>
> (3) has not received a degree of doctor of medicine, osteopathy, dentistry, veterinary medicine, optometry, or podiatry, degree of bachelor of science or doctorate in pharmacy, graduate degree in public health, degree of doctor of chiropractic, graduate degree in health administration, doctoral degree in clinical psychology, or degree in social work or a degree equivalent to one of these.

Allied health has been one of the fastest growing segments of the general labor market. Under the broadest definition of the allied health workforce approximately two-thirds of health personnel are allied health workers. The Bureau of Health Professions, for program and educational assistance purposes, has narrowed the definition of allied health to specific groups of allied health occupations receiving professional training at the post-secondary school level. Under this more restrictive definition it is estimated that there were approximately 1.4 million allied health personnel in 1988 (Figure X-1), an increase of 22 percent since 1980.

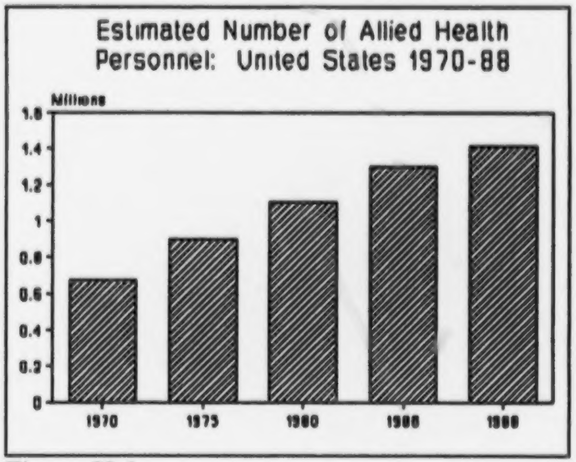

Figure X-1

This increase in numbers of personnel along with redefinition of roles and functions of specific allied health disciplines, require continued discussion of standards for training and practice. In addition, factors such as increased need for care of the elderly, changes in reimbursement policies, health care cost containment, changes in supply of other health professionals, decreases in student population, and increases in educational costs must continue to be monitored to assess their impact upon allied health personnel.

The 1988 Study of the Role of Allied Health Personnel in Health Care Delivery by the Institute of Medicine (IOM) of the National Academy of Sciences provided valuable information about the composition of the allied health workforce and its changing characteristics (DHHS 1988b). The IOM study assessed the role of allied health personnel in health care delivery and identified projected needs, availability, and requirements of various types of health care delivery systems for each category of allied health personnel. The study also investigated current practices under which each type of allied health personnel obtains licenses, credentials, and accreditation. It also assessed changes in programs and curricula for the education of allied health personnel and in the delivery of services by those personnel necessary to meet needs and requirements. In addition, it assessed the roles of the Federal, State, and local governments, educational institutions, and health care facilities in meeting needs and requirements. The study selected 10 large well-known allied health fields for detailed review to exemplify different aspects of the occupations.

The IOM Study did not explicitly report a shortage of allied health personnel, but, drawing heavily upon projections from the Bureau of Labor Statistics (BLS), the study reported that demand for personnel in nine of ten fields studied is expected to exceed the projected 19 percent growth rate for the total labor force in the year 2000. The greatest job growth is expected to occur in physical therapy (87 percent) and medical record specialists (75 percent).

The study further reported a need for decision makers to improve the workings of the market so that "severe imbalances" in supply and demand may be prevented in the fields of radiologic technology and occupational therapy. In other allied health fields studied it was concluded that supply would be in balance with demand for the foreseeable future.

In the education sector the study pointed out that many allied health fields are incurring substantial losses of applicants and some closures of training programs which, if not stopped, will cause significant future supply problems. Both demographic and market factors contribute to this problem. In addition, allied health training programs are facing increasing and chronic shortages of qualified faculty, a problem creating constraints in supply especially evident in physical therapy.

The IOM Study also found that inadequate investment and attention to research and data needs in allied health impede the ability to properly assess adequacy of supply, magnitude of demand, appropriate utilization of personnel, workforce characteristics, and other factors important for policy decisionmaking.

In order to assess the extent of health care personnel shortages in hospitals, the American Hospital Association undertook a survey of 7,064 hospitals in late summer and early fall of 1988 (AHA, 1988b). Results indicated that the personnel categories with the highest full time vacancy rates were physical therapist (16.3 percent) and occupational therapist (14.7 percent).

Among hospitals with vacant full-time physical therapist positions, 57 percent replied that it took 90 days or more to fill a vacancy. Two of five hospitals with vacant occupational therapist positions also stated that 90 days or more were required to fill such positions.

A 1986 survey of 167 facilities by the Department of Veterans Affairs found that the average vacancy rate for physical therapists was 22.9 percent; respiratory therapists, 15.9 percent; and therapeutic radiologic technicians and technologists, 15.1 percent.

Another recent study yielding relevant information is the 1987 study of approved educational activities in nursing and other nonphysician health professions for which hospitals are reimbursed under Medicare, developed in response to requirements of the Consolidated Omnibus Budget Reconciliation Act of 1985 (DHHS, 1988a). The study report covered the allied health disciplines of cytotechnology, dietetic internships, medical technology, occupational therapy, physical therapy, medical records, radiography, respiratory therapy, and nuclear medical technology. Program representatives and hospitals administrators generally cited recruitment as the most important program benefit to the hospital. This was often borne out in that large proportions of newly hired individuals from the respective disciplines came from programs connected to the hospital. Other important benefits cited were better patient care and ability to obtain better qualified staff.

According to a study of allied health education, the number of allied health personnel per 100,000 population in rural and other non-metropolitan areas in specific disciplines such as dietetics, speech therapy, respiratory therapy, radiologic technology, physical therapy, and occupational therapy is one-half to three-fourths that of metropolitan areas (Hamburg, 1985). The IOM study maintained that lower rural concentration may in part be due to lower concentration of some of the practitioners and institutions that usually employ allied health personnel in rural areas. However, allied health education takes place primarily in metropolitan areas. Graduates are often drawn to settings similar to where their clinical experience was provided, namely acute care settings with the patient volume needed to support state-of-the-art high technology services. Rural facilities are often perceived by graduates as isolated and lacking in state of the art technology.

In the following sections discussion of trends in supply, enrollment, graduates, and educational programs as well as estimates for future need for specific allied health disciplines are presented. This discussion draws upon material from the IOM Study on the Role of Allied Health Personnel in Health Care Delivery as well as a variety of other sources. It should be noted that discrepancies in estimates can arise due to different occupational definitions presented by the professional associations, Bureau of Labor Statistics, Bureau of the Census, and the American Hospital Association, as well as the manner in which data are collected. The specific disciplines included for discussion are clinical laboratory technology, physical therapy, occupational therapy, dietetics, medical record administrators, radiologic technology, speech-language-hearing, and respiratory therapy. Other major allied health personnel categories are discussed in the chapters of the health professions with which they are closely linked (e.g., physician assistants in the medicine chapter and dental hygienists, assistants, and laboratory technicians in the dentistry chapter).

Clinical Laboratory Personnel

Developments in Supply

Clinical laboratory personnel perform a variety of tests used to assist physicians in preventing, detecting, diagnosing, and treating diseases. The medical technologist is the generalist in this field, but the field has many specialists including blood bank technology, cytotechnology, hematology, histology, microbiology, and clinical chemistry. Practitioners fall into two broad categories: baccalaureate-prepared technologists and associate degree and certificate-prepared technicians. Technicians perform routine tests under the supervision or direction of pathologists or other physicians, scientists, or experienced medical technologists. Technologists are able to recognize interdependency of tests and have knowledge of physiological conditions affecting test results in order to confirm these results and develop data useful to a physician in determining the presence, extent, and, as far as possible, the cause of disease.

Most clinical laboratory personnel are trained in collegiate programs or in clinical training programs of hospitals, clinics, and blood banks following post-secondary academic preparation. The Committee on Allied Health Education and Accreditation (CAHEA) accredits programs for medical technologists, medical laboratory technicians, histologic technologists, cytotechnologists, and specialists in blood bank technology.

Six States--California, Florida, Hawaii, Michigan, Nevada, and Tennessee--regulate the practice of medical technology through licensure. New York also licenses medical technologists, but only those practicing in New York City. Scope of practice is largely uniform throughout the six states that regulate them.

Information about the clinical laboratory workforce is sketchy; very little is known about the numbers or characteristics of large segments of the work force. According to the American Society of Clinical Pathologists, which maintains a registry of personnel, 172,200 technologists and 37,300 technicians were registered in 1987.

The 1988 Current Population Survey conducted by the Bureau of the Census estimates that 264,000 persons were employed as clinical laboratory technologists and technicians. Of this number, 188,000 or 71 percent were employed in hospitals. The American Hospital Association's 1987 survey of employment in registered hospitals shows that 56 percent of the 158,500 full-time equivalent (FTE) hospital medical laboratory personnel were medical technologists (AHA, 1988a). Hospital employment in laboratories, according to AHA, declined between 1982 and 1985, from 165,700 to 158,000 FTE's, a decline of 4.6 percent. However, since laboratory work has been moving out of hospitals, this may not actually represent a drop in demand for personnel. About three-fourths of all clinical laboratory technologists and technicians are female.

Enrollment and Graduates

In 1988 there were 3,432 baccalaureate graduates of medical technology programs, a decrease of 35 percent since 1982 (Table X-I). The number of CAHEA accredited programs also decreased from 639 in 1982 to 464 in 1988, a decrease of 27 percent. During the same period, total medical laboratory technician programs at the certificate level declined from 73 to 44, but programs at the associate degree level increased from 187 to 212. Total enrollment for both types of medical laboratory technician programs declined by one-third, from 9,431 in 1982 to 6,205 in 1987. The numbers of graduates for both types of technician programs also declined, from 3,165 in 1982 to 2,370 in 1988, a decline of 25 percent.

Demand for Clinical Laboratory Technologists and Technicians

Although the growth rate is below that forecast for other health occupations, the Bureau of Labor Statistics forecasts a growth of 24 percent in the number of new jobs for clinical and medical laboratory technologists and technicians between 1986 and the year 2000. Clinical laboratories are in a period of rapid change. New testing procedures, changes in reimbursement, and new settings for health care all impact upon demand for clinical laboratory personnel. Growth in demand for medical and clinical laboratory technologists and technicians will derive from general expansion of the health care industry, aging of the population, increased therapeutic drug monitoring, testing for substance abuse, AIDS screening, and advances in technology.

Table X-I

Number of Medical Laboratory Programs and Graduates: 1982 through 1988

	1982	1984	1986	1988
Type of Program		Number of Programs		
Medical Technology	639	615	516	484
Med. Lab. Tech. (Assoc)	187	221	214	212
Med. Lab. Tech. (Cert)	73	57	47	44
		Number of Graduates		
Medical Technology	5,318	5,270	4,477	3,438
Med. Lab. Tech. (Assoc)	1,860	2,437	1,930	1,568
Med. Lab. Tech. (Cert)	1,305	1,317	817	802

Although the relationship between supply and demand cannot be predicted with certainty, recent data collected by the American Society of Clinical Pathologists (ASCP) shows a high level of unfilled technologist positions in medical laboratories in hospitals. In addition, ASCP also reported that, based on their surveys, more than three-fourths of laboratory managers perceive a shortage of laboratory personnel in their communities.

Physical Therapy

Developments in Supply

Physical therapists plan and administer treatment to relieve pain, improve functional mobility, maintain cardiopulmonary function, and limit disability of people suffering from disabling injury or disease. Physical therapy is utilized in the treatment of nerve or muscular injuries, amputations, fractures, arthritis, burns, congenital anomalies, and neurological disorders. Physical therapists are licensed in all States.

Physical therapists work in a variety of employment settings. In 1987 one-third of physical therapy positions were located in hospitals. The American Hospital Association reported a full-time equivalent employment of 20,500, an increase of 18 percent over the level of employment six years earlier. The American Physical Therapy Association (APTA) estimates the number of licensed physical therapists to be about 66,000. About 25 percent of physical therapists are men, although there has been some decline in this proportion in recent years. Approximately 10 percent are from minority groups.

About two-thirds of physical therapists are full-time salaried personnel according to APTA. An increasing proportion, 22 percent, of physical therapists have master's degrees with about 7 percent having a master's degree as an entry level degree. The 15 percent of the workforce who worked full time for themselves grossed nearly $73,000 on average in 1986. Physical therapists who were full-time salaried employees averaged $32,000 in that year.
It should be noted that gross income is not comparable to wages of salaried employees since practice expenses are included.

Enrollments and Graduates

Basic occupational preparation for physical therapy is obtained in bachelor's or master's degree programs accredited by the American Physical Therapy Association's Commission on Accreditation in Physical Therapy Education. In 1989 there were 130 accredited entry-level programs, an increase of 11 over 1986 and 54 programs more than in 1970. In 1988 these programs graduated 4,105 students. The number of entry level programs increased by 19 percent during the 1980 to 1985 period and by 15 percent during the 1985 to 1989 period. The number of graduates of such programs increased by 43 percent from 1980 to 1985 and by 17 percent between 1985 and 1989.

Unlike other allied health disciplines physical therapy has not experienced applicant shortages. Despite a large increase in the number of physical therapy programs most program directors report that they have more than adequate numbers of applicants and can limit enrollment to those with relatively high grade point averages. The positive economic outlook for physical therapy--rising salaries, growing autonomy, and high demand for graduates--appears to account for the steady demand for physical therapy education.

Demand for Physical Therapy Services

Several forces support the expectation of strong growth in demand for physical therapy services. Physical therapy services are reimbursed by commercial carriers. Workmen's Compensation covers much of the expense for testing and therapeutic treatment by physical therapists. Medicare covers home visits by physical therapists in inpatient and outpatient settings.

Increased health services to the growing elderly population will put additional pressure on the workforce. Already the elderly consume over 20 percent of physical therapy services. Increases in home health care, a work setting in which productivity is reduced, will exacerbate this pressure.

Taking these factors into consideration, there may be a substantial deficit between the number of new physical therapists needed and the net increase in the workforce. The practice settings experiencing the greatest shortages are hospitals, schools, nursing homes, and rehabilitation centers.

Occupational Therapy

Developments in Supply

Occupational therapists direct their patients in activities designed to help them learn the skills necessary to perform daily tasks, diminish or correct pathology, and promote and maintain health. Occupational therapists work in many different settings including rehabilitation and psychiatric hospitals, school systems, nursing homes, and home health agencies. They work both with mentally disabled and physically disabled individuals across the whole spectrum of age groups. As of 1989, 35 States, the District of Columbia, and Puerto Rico had licensure laws. Three additional States (Kansas and Michigan, Minnesota) have registration laws requiring competency standards and four States, Virginia, Missouri, Indiana and Wisconsin have certification laws. All of the regulatory boards have adopted the American Occupational Therapy Certification Board (AOTCB) examination as the licensure examination. In addition, two States (California and Hawaii) have mandatory title acts which mandate entry level standards and prohibit unqualified individuals from calling themselves occupational therapists or assistants. According to data reported to the American Hospital Association nearly one-half of all hospitals had occupational therapy services in 1987.

The AOTA estimates that there were approximately 37,600 working occupational therapists in 1989. Of this number approximately 30,400 were on the American Occupational Therapy Association list of registered active members. The vast majority of occupational therapists are female (median age 32). Nearly three-fourths work full-time and 20 percent are self-employed. The AHA, in its 1987 Survey of Hospitals, reported 11,500 FTE Occupational Therapists employed in hospitals, an increase of nearly 7 percent from the previous year.

Enrollments and Graduates

The CAHEA accredits educational programs for occupational therapists. Basic occupational preparation is offered in programs granting the bachelor's degree, a post-baccalaureate certificate, or a master's degree. The number of accredited programs has been increasing. The AOTA's annual education survey reported 67 schools offering accredited programs in 1988, up from 55 in 1982. Of the 67 schools offering programs 63 offered baccalaureate degrees, 13 post-baccalaureate certificates, and 16 entry-level master's degrees. The number of graduates in programs offering basic occupational preparation in 1988 was 2,431, an increase of 18 percent over 6 years earlier. The total enrollment in these programs increased from 6,825 in 1981-82 to 7,741 in 1988-89, an increase 13 percent. In 1988 there were 261 graduates from entry level master's programs and 99 graduates of advanced post-professional master's degree programs. Sixty-five schools offered programs for occupational therapy assistants, consisting of 62 associate degree and 6 certificate programs. They were also accredited by AOTA.

Demand for Occupational Therapy Services

The Bureau of Labor Statistics estimates that jobs for occupational therapists will increase by 52 percent between 1986 and 2000. BLS analysts identified a number of factors for this strong growth rate. These factors include occupational therapists increasing their share of hospital employment, federal legislation concerning services for handicapped children increasing employment in school services, and increases in private practice opportunities stimulated by changes in reimbursement. Other factors such as use of occupational therapists in prolonging the independence of AIDS patients could also generate demand for more occupational therapists.

In addition, changes in Medicare such as the coverage in Part B for services by occupational therapists in skilled nursing facilities and the addition of occupational therapy as a Medicare-covered rehabilitation agency service is expected to increase the demand for occupational therapy services. Expansion of home health care will also increase demand as will special education funding and related services to handicapped preschoolers.

Dietetic Services

Developments in Supply

Dieticians are health professionals trained in nutrition and institutional management. They have responsibilities directed toward adequate nutritional care, including therapeutic nutrition, of individuals and groups in institutional settings. Professional activities within dietetics include clinical dietetics, research, education, and administration. Among concerns of dieticians are nutrients in food and the relationship between proper diet and health.

Sixteen jurisdictions (including the District of Columbia and Puerto Rico) regulate the practice of dietetics: eight through licensure, five through certification, and three through registration. The scope of practice of dietetics is largely uniform throughout the United States.

Estimates of the size of the dietetic workforce vary. The American Dietetic Association (ADA) estimated an active membership of 44,600 in 1987. The Bureau of Labor Statistics estimates that approximately 40,000 dietician jobs existed in 1986, with 37 percent in hospitals. The 1988 Current Population Survey of the Bureau of the Census estimates that in 1988 there were 70,000 persons in dietetic positions, which includes dietary technicians as well as other related positions. Only 6 percent of dietetic positions were held by men; the proportion of minorities in the field was also small--8 percent.

The AHA has found a 4 percent decline in full-time equivalent employment of dieticians in hospitals, from 14,400 in 1981 to 13,900 in 1987. The ADA reports that over 60 percent of members were under 40 years of age. Most were women and relatively small percentages were of minority racial ethnic backgrounds.

The BLS reports that nursing homes and hospitals are the major sources of wages and salary jobs in the field of dietetics, approximately 14 and 39 percent respectively. Employers such as retail eating and dining places, publishers of nutrition and periodicals, diet counseling services, child care centers, and food manufacturing also employ a small number of dieticians. A survey of members of the ADA confirms that more than one-half of full-time members are employed in hospitals and that one in ten full-time members is employed by extended care facilities. The survey also notes that while very few full-time workers were self employed, more than one-third of dieticians who worked part-time were self employed.

Education of Dietetic Personnel

In order to take the dieticians registration examination of the American Dietetic Association a baccalaureate degree with a major in foods and nutrition or institutional management from one of 65 Coordinated Undergraduate Programs accredited by ADA is required. Such programs combine academic coursework with about 1,000 hours of clinical experience. A student graduating from an unaccredited program must complete either a one-year internship or, alternatively, other experience provided to supplement a degree program. Between 1980 and 1987 the number of newly-registered dieticians fell 20 percent, from just over 3,000 to slightly under 2,400.

Demand for Dietetic Services

There are a number of factors to be considered in determining demand for dieticians: consumer desire for nutritional advice, new places of employment, substitution of other professionals for dieticians, and interest in the relation of nutrition to health promotion and disease prevention. The Institute of Medicine Report concludes that employment growth expectations for dietetic personnel are well above the national average, but are moderate to modest when compared with other allied health fields. Demand for new dietetic services will be primarily driven by public demand and most likely occur in settings marketing directly to consumers and advising them in health promotion and disease prevention.

Medical Records Personnel

Developments in Supply

Medical records personnel develop, implement, and manage medical information systems. They keep track of the patient records of an institution, compile statistics required by Federal and State agencies, and assist the medical staff in evaluating patient care. These personnel also work closely with hospital budget personnel to monitor spending patterns. Three of four medical records positions are located in hospitals; other major employment sites include HMOs, nursing homes, and group practices. Medical records personnel are also employed by insurance, accounting, and law firms and companies that market medical information systems.

Because registration is voluntary and many on-the-job personnel are used in lower level positions, it is difficult to estimate the size and composition of the medical records workforce. The American Medical Record Association (AMRA) reported 8,240 registered medical record administrators and 14,700 accredited record technicians in 1987. The

Current Population Survey of the Bureau of the Census estimates 56,000 persons in medical records related positions in 1988, 70 percent employed in hospitals. The American Hospital Association in its annual survey of hospitals determined that there were 8,400 medical record administrators employed in 1987 on a full-time-equivalent basis and 43,000 FTE medical record technicians employed in hospitals. These numbers represented a 16 percent growth in employment of administrators and 18 percent in the employment of technicians in hospitals from six years earlier.

Enrollments and Graduates

The Committee on Allied Health Accreditation accredits educational programs for Medical Records Administrators and Medical Records Technicians. Medical Records Administrator Programs are four years in length and award a Bachelor of Science degree or a post-baccalaureate certificate after, generally, one year of additional study. Medical Records Technician programs, 2 years in length leading to an associate degree, are also accredited by CAHEA. In 1988 there were 726 graduates of Medical Records Administrator programs. This number has fluctuated during the 1980s, having reached a high of 896 graduates in 1986. The number of CAHEA accredited programs in medical records administration declined from a high of 57 programs in 1982 to 53 programs in 1988. During the same period the number of CAHEA accredited Medical Records Technician programs increased from 85 programs in 1982 to 97 in 1988. The number of graduates in both types of programs increased from 808 in 1982 to 1,148 (figure X-2) in 1988, an increase of 42 percent.

In addition, there is an independent study program accredited by AMRA for individuals qualifying to become Medical Records Technicians. This 3-year program, which includes 30 semester hours of academic training, had an enrollment of 2,556 students in 1988 and graduated 257 students in that year.

Demand for Medical Records Services

According to the IOM Report on the Role of Allied Health Personnel in Health Care Delivery, current trends indicate that the knowledge and skill level needed in medical records is rising and will continue to rise in the foreseeable future. Therefore, a greater proportion of trained practitioners will be needed to fill current and future jobs. To avoid a shortage of medical records personnel to the year 2000 the labor market must make major adjustments that will cause medical records technology to be viewed as a more promising career than it is today.

Radiologic Services

Developments in Supply

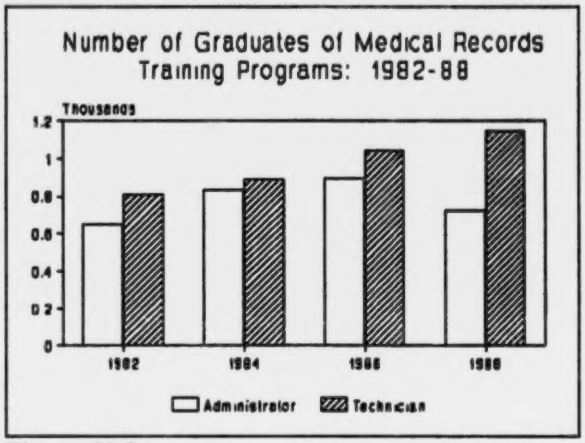

Figure X-2

Originally provided almost exclusively by radiologists and their technical assistants, radiologic services have expanded considerably in recent decades. Medical and technological advances have generated a number of new specialties. The application of radioactive tracers has led to the profession of nuclear medical technology; the treatment of cancer with new types of X-ray equipment has led to radiation therapy technology; and the development of ultrasound imaging equipment, to diagnostic medical sonography.

Upon a physician's request a radiographer utilizes x-ray equipment to produce images of various body structures for diagnostic purposes. The radiation therapy technologist (RTT) prepares patients for radiotherapy and administers prescribed doses of ionizing radiation as a treatment for cancer and similar types of diseases. Nuclear medicine technologists (NMTs) participate in various activities involving radiopharmaceuticals in diagnosis and treatment. Sonographers, also known as ultrasound technologists, use non-ionizing equipment that transmits high frequency sound waves into the patient's body and collects reflected echos to form images.

Radiologic technologists and technicians (including radiographers, radiation therapy technologists, nuclear medicine technologists, and diagnostic medical sonographers) held about 125,000 jobs in 1986 according to data from the Bureau of Labor Statistics. About two of three jobs were located in hospitals. Other employment sites include clinics, laboratories, and doctors' offices. About three of four persons employed in the field were female and about 10 percent were members of minority groups. According to recent data from the American Hospital Association the number of radiographers employed on a full-time-equivalent basis in U.S. Registered Hospitals grew by 12 percent from 53,700 in 1981 to 60,100 in 1987, a growth of 12 percent. The number of FTE Radiation Therapy Technologists increased from 4,000 to 4,700 during this period or 18 percent. Nuclear medicine technologists employed on a full-time-equivalent basis grew during this time from 7,200 to 7,700, or 7 percent. However, other radiologic personnel decreased 1 percent from 32,000 FTE in 1981 to 31,700 in 1987.

Enrollments and Graduates

The Committee on Allied Health Education and Accreditation in collaboration with the American College of Radiology and the American Society of Radiologic Technologists accredits educational programs for radiographers, radiation therapy technologists, and nuclear medicine technologists. Programs in radiography are generally two to four years in length depending upon objectives and the degree or certificate awarded. In 1988 there were 667 such programs which graduated 6,080 students in the previous academic year. The total enrollment in these programs exceeded 15,300. There has been a steady decline in graduates of radiography programs since 1981 (Figure X-3). Graduates of such programs have declined by 23 percent since that year.

Programs in radiation therapy technology may be two or four years in length or, for those who have graduated from programs in radiography, one year. The number of programs has fluctuated, declining from 108 in 1982 to 98 in 1984, increasing to 104 in 1986, and declining to 99 in 1988. The number of graduates in 1987-88 was 502, having declined from the high level of 576 two years earlier. Total enrollment in these programs in the 1987-88 academic year was 816, about 16 percent less than the high enrollment level two years earlier.

The number of nuclear medicine technologist programs has declined from 143 in 1984 to 106 in 1988. The number of graduates declined 44 percent from 813 in 1984 to 453 in 1988. Total enrollment also declined to 956 in academic year 1987-88.

Demand for Radiologic Personnel

According to the IOM Study, even if the decline in graduations from radiologic education programs is stemmed, strong adjustments in the labor market will be needed to avoid a shortage of practitioners through the year 2000. It appears that radiologic technologists, especially those with specialized training, are finding jobs easily. According to information provided to IOM, hospitals are competing with free-standing employers for scarce personnel, and some employers are unable to hire the staff they are seeking. Recent data from the CAHEA survey of program directors

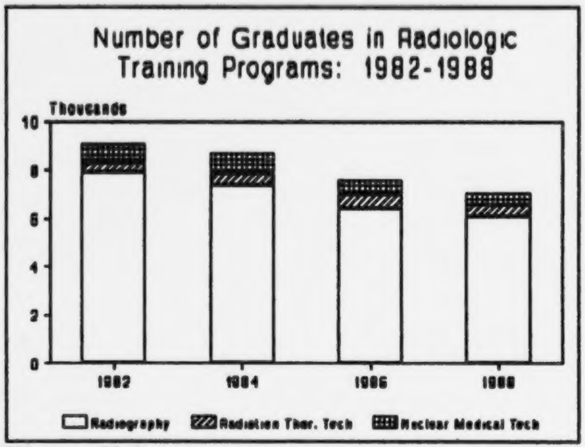

Figure X-3

also revealed that employers are starting to have difficulty in hiring. The percentage of program directors who believed that radiography is an attractive opportunity increased from 60 percent in 1981 to 89 percent in 1987.

Speech-Language Pathology and Audiology

Developments in Supply

Speech-language pathologists and audiologists are professionals who are qualified to identify, assess, and provide treatment for individuals with speech, language, or hearing disorders. Speech-language pathologists are specialists in the understanding and expression of human communication, its normal development, disorders, and the prevention of these disorders. Audiologists are specialists in prevention, identification, and assessment of hearing impairment, and in the rehabilitation of persons with hearing impairments including the fitting and dispensing of hearing aids.

Thirty-seven states and Puerto Rico regulate the practice of speech-language pathology and audiology through licensure. The scope of practice of speech-language pathology and audiology is largely uniform throughout the United States.

The American Speech-Language-Hearing Association (ASHA) in its 1988 Workforce Study estimates the active supply of personnel in the field as 83,100, of whom approximately one-half are members of the Association (ASHA, 1988). The Study found that ASHA and non-ASHA personnel were similar in age, gender, marital status, race/ethnic background, and geographic distribution. Almost all ASHA members had the master's degree as the highest degree while a substantial portion of non-members had only the baccalaureate degree. Employment characteristics of the two groups were similar. Approximately three of four members were employed full-time, the median number of years of experience was at least ten, and over one-half were employed by governmental agencies or organizations. While three out of four non-members were employed in school settings, less than one-half of ASHA members were employed in this setting. In addition, clinical service provision was reported as the primary professional activity for a greater proportion of the non-ASHA group compared with the ASHA group.

The demographic and employment differences appear to be related. Having only a baccalaureate degree allows employment in public school settings in many states whereas the master's degree is the entry level degree for other work settings.

The number of speech-language-hearing personnel employed in hospitals is very small; AHA reports that only 5,700 such personnel were employed on a full-time equivalency basis in 1987.

Enrollments and Graduates

Data from the Council of Graduate Programs in Communication Sciences and Disorders for the 1986-87 academic year indicated that there were 9,138 master's degree students enrolled in the profession, 4,027 Master's Degrees having been awarded in 1985-86. In 1986-87, there were 15,088 undergraduate level students compared with 17,108 in 1983-84, a decrease of 12 percent. Baccalaureate degrees declined by 2.5 percent, from 4,129 in 1982-83 to 4,028 in 1985-86. The number of doctoral students in 1986-87 totalled 794. In 1985-86 119 doctoral degrees were awarded.

Demand for Speech-Language-Hearing Personnel

No national data source on demand for speech-language pathologists and audiologists exist because of difficulties in measurement and interpretation. Although there are no national data on unfilled vacancies, the American Hospital Association reported a vacancy rate for speech-language pathologists and audiologists of 3.5 percent, about the same as the overall vacancy rate for all hospital personnel in 1984. The ASHA in its recent Work Force Study, while recognizing the difficulties in estimating demand for the profession, states that there are unfilled positions in the field. Vacant positions may be located in rural geographic areas, have low salaries or poor working conditions.

If baccalaureate graduations are maintained at approximately the same level as the last few years, and if most of these graduates go on to master's degrees in speech-language-pathology or audiology, there should be a continued balance between supply and demand to the year 2000. Factors that may affect future demand for persons in this field include: medicare reimbursement of rehabilitation services; school systems growth and financing; patterns of specific diseases; and treatment such as stroke, head trauma, and deafness in youth; and growth in independent practice opportunities and contractual arrangements with free-standing speech-language pathology and audiology organizations.

Respiratory Therapy Personnel

Developments in Supply

Respiratory therapy personnel are employed under medical supervision in a wide range of services from providing emergency care to relief for patients with emphysema or asthma. Because anesthesia depresses breathing, they often treat post-surgical patients both postsurgery to prevent respiratory illness. Most respiratory therapists work in hospital settings, although increasing numbers are employed by nursing facilities and medical equipment rental companies.

The BLS estimates that 56,000 respiratory therapy jobs existed in 1986. Data from the Current Population Survey of the Bureau of the Census estimates that 65,000 persons were employed in this field in 1988 of which approximately 60 percent were women. The AHA states that 34,200 respiratory therapists were employed on a full-time equivalency basis in 1987, an increase of 47 percent over the FTE employment in hospitals of 23,200 in 1981. FTE employment of respiratory therapy technicians decreased by 14 percent over this period, from 26,200 in 1981 to 22,500 in 1987.

Enrollments and Graduates

The CAHEA accredits educational programs for both respiratory therapists and respiratory therapy technicians. Training is offered at the post-secondary level in colleges and universities, medical schools, trade schools, and hospitals. In order to be accredited by CAHEA, programs for respiratory therapists must be at least two years in length and lead to an associate or baccalaureate degree. Technician programs usually last one year. Certification is voluntary and available through the National Board for Respiratory Care. In 1988 there were 2,939 graduates of 253 respiratory therapy programs and 2,768 graduates of 162 respiratory therapy technician programs (table X-2). The number of CAHEA accredited respiratory therapy programs increased by 24 percent over the 1982 level of 204 programs. However, the number of graduates of such programs decreased from 3,342 in 1981 to 2,939 in 1988, 12 percent. The number of CAHEA accredited respiratory therapy technician programs declined from 188 in 1982 to 162 in 1988, 14 percent. Graduates of such programs also declined by 15 percent, from 3,275 to 2,768.

Demand for Respiratory Therapy Personnel

The IOM Report states that, if the number of graduations from educational programs can be maintained at approximately today's level, the nation's supply of respiratory therapists should be adequate for demand through the year 2000. This implies that significant changes in the rate of salary growth or major improvements in the conditions of employment should not be expected. The Bureau of Labor Statistics predicts that by the year 2000 there will be 75,600 jobs for respiratory therapists--an increase of one-third over the present level. This is a substantially higher growth rate than in total national employment and in some other allied health fields.

The expectation of growth in respiratory therapy by BLS is predicated largely on the assessment of how such personnel will fare in the hospital setting. BLS projects increases in demand for respiratory therapy personnel due to increased admission of older and sicker patients requiring more intensive care and improvements in trauma care that allow the survival of more accident victims in need of ventilator care. Another technological development contributing to increased demand for respiratory services in hospitals is the development of small ventilators for low birthweight neonates. Respiratory therapists are also being increasingly used to provide non-respiratory care services in hospitals.

Table X-2

Number of Respiratory Therapy Programs and Graduates: 1982 through 1988

	1982	1984	1986	1988
Type of Program	Number of Programs			
Respiratory Therapy	204	220	235	253
Resp. Therapy Technician	188	178	169	162
	Number of Graduates			
Respiratory Therapy	3,342	3,308	2,470	2,939
Resp. Therapy Technician	3,275	3,849	2,535	2,768

Other Disciplines

Clinical Psychologists

There are approximately 50,000 doctorally-trained psychologists licensed in all 50 States and the District of Columbia to independently diagnose and treat mental and nervous disorders. Most State laws require, as a minimum, a doctoral degree in psychology from an accredited institution and at least 2 years of supervised experience by a senior psychologist. To further ensure quality, an ethical code has been adopted as part of all State licensing laws.

The role of clinical psychologists in the health care field has expanded dramatically in recent years. Psychologist play an integral role at the Federal level, in hospital settings and in private practice. Psychologists are currently recognized in Federal programs such as the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), the Veterans Administration, and the Federal Employees Health Benefit Plan (FEHBP), and are eligible for the Federal Health Education Assistance Loans program. They also provide services to Medicaid and Medicare/HMO enrollees in community mental health centers and in rural health clinics.

Psychologists are playing an increasing role in prevention, treatment and research regarding AIDS. As specialists in behavior change at an individual and community level, psychologists are major participants in planning successful prevention campaigns, in designing and implementing appropriate models of AIDS patient care and in assessing and treating the emotional and neuropsychological aspects of AIDS. The psychologists' analyses of social interactions have been integral to developing the ethical and legal structures used to deal with the AIDS epidemic.

Similarly, psychologists play a central role in prevention and treatment of drug and alcohol abuse by actively designing drug abuse education and prevention programs and treating substance abusers in clinics and hospitals. School-based activities of psychologists have also increased students' knowledge of the pharmacological effects and physical and social hazards of abuse to mold attitudes and beliefs supportive of drug abstinence.

Since the mid-1980s, psychologists have increased their presence in a variety of outpatient psychotherapy and psychological diagnostic evaluations. They continue to be in the forefront of the leading psychological and biological research on the mind/body interface, including the diagnosis and treatment of stress disorders, neurological impairments, brain disease and psychosomatic illness.

Medical Social Workers

Medical social workers are trained to help patients and their families cope with devastating illnesses and handle problems that may stand in the way of recovery or rehabilitation. Patient counseling--working with children suffering from terminal illness, for example--is handled differently from one hospital to the next. Generally, it is the responsibility of the social work department. This traditional role has expanded as technology has made it possible for very sick people to survive months or even years longer than they used to. In addition, the increasingly popular practice of assisting family caregivers has created new roles for hospital social workers, who have taken the lead in organizing support groups for patients suffering from cancer, Alzheimer's disease, or other illnesses that impose a heavy burden upon families.

Other medical social work roles are evolving. In some hospitals, social workers undertake primary care functions in departments of pediatrics or obstetrics. A few specialize in organ transplant procurement. Others work in interdisciplinary teams that specialize in evaluating certain kinds of patients--geriatric or transplant patients, for example. Social workers are also involved in hospitals' efforts to increase utilization by offering new programs and services. Examples are adult day care, respite care, hospice care, health screening and education, worksite wellness, and employee assistance programs.

Multi-Skilled Health Practitioners

A multi-skilled health practitioner is a health care worker prepared to function in two or more traditional health occupations or roles. For example, a physical therapist may be prepared to function as an occupational therapist, a registered nurse as a physician assistant, a radiologic technologist as an ultrasound technician. In the early and mid-1970s the Federal government supported three efforts preparing multicompetent workers. One such effort was to investigate the usefulness, practicality, and demand for multiskilled workers in rural areas. Within the confines of its limited scope the contract established the usefulness of rural health workers able to deliver multiple types of health services. A second project established an apprenticeship program for the multicompetent clinical assistant. The third activity assisted with establishing an associate degree program for the Multiple Competent Clinical Technician.

In 1987 the Kellogg Foundation awarded "The Multi-skilled Health Practitioner Clearinghouse" grant to the University of Alabama at Birmingham to act as a repository and disseminator of information related to multiskilled practitioner educational programs and employers. The grant was an attempt to rationalize on a nationwide basis the ad hoc information gleaned from reports and conferences sponsored by different organizations. Ten percent of the institutions responding to the grant's questionnaire stated that they had at least one program preparing multiskilled workers and that a total of 75 formal educational programs were in operation across the Nation. In addition, 130 hospitals documented that they employ multicompetent workers in various capacities. Indications are that less formal in-service training is being given to employees at numerous hospitals and health care facilities.

Area Health Education Centers

Another area of continuing interest is Area Health Education Centers (AHEC). Undergraduate training is provided to allied health students in 13 of 17 ongoing AHEC programs. The allied health disciplines identified most often as participants are dental hygiene and physical therapy. Schools of allied health and community colleges have worked closely with AHEC programs. In rural areas community colleges provide training resources for entry into allied health professions. In addition, continuing education of practicing health professionals is one of the program activities of AHEC programs. Allied health personnel participate in continuing education programs offered through the 17 AHEC programs and 43 centers associated with the programs. Topics include: AIDS, geriatrics, women's health issues, health promotion-disease prevention, adolescent sexuality, drug abuse, and environmental health.

Status Report on Development of Allied Health Reporting System

Recognizing the weaknesses in allied health data, Section 708 of the PHS Act provides for the establishment of an allied health professions reporting system. At present, an important activity related to the development of such a system has been the initiation of the Strategic Allied Health Data Initiative (SAHDI) by the Bureau of Health Professions. The SAHDI project consists of a cooperative effort with staff from the Bureau of Labor Statistics, the National Center for Educational Statistics, professional associations, accreditation organizations, and others to improve the comparability, accuracy and consistency of data collected in allied health through the provision of technical support for the standardization of data collection instruments, promotion of improved analytical approaches, and the building of a common data set. In addition, discussion has taken place between the Bureau of Health Professions and professional associations concerning the establishment of an electronic bulletin board system which would permit the sharing of existing allied health information. Such a system would be maintained by the Bureau but would be fully accessible to the allied health community.

Further discussion of data related problems in other disciplines is found in Chapter V.

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Chapter XI

OPTOMETRY

Introduction

Developments in Supply

Doctors of Optometry (Optometrists) are health professionals educated, clinically trained, and State licensed to examine the eyes and vision system, diagnose problems or impairments and prescribe and provide treatment. Among the types of treatment optometrists use are prescription glasses, contact lenses, vision therapy, low vision aids, and, in some States, pharmaceutical agents for therapeutic purposes.

The number of active optometrists in the United States has increased moderately in recent years with the number of newly graduated optometrists nearly double the number of optometrists leaving the profession. In 1988 there were an estimated 26,100 active optometrists with 25,200 providing some form of patient care and the remainder in teaching and research activities. The number of active optometrists has increased from 22,200 in 1980, or 18 percent. In addition to increases in the number of active optometrists, the growth rate in active supply exceeds that of the general population. The ratio of active optometrists per 100,000 population has increased from 8.9 in 1970 to 9.7 in 1980 and to 10.8 in 1988 (AOAb).

Optometry is increasingly populated by younger practitioners, the median age falling from nearly 49 years in 1980 to 41 years in 1988. Nearly 30 percent of active optometrists were 50 years of age and over in 1988. Recent increases in graduates are evident in that one-third of active optometrists were under age 35.

Employment of Optometrists

A trend during recent years has been the seeking out, especially by optometrists recently entering the workforce, of employment opportunities in the offices of ophthalmologists, or in other employment settings such as optical firms. (There are an estimated 4,200 optometrists working for optical firms, Bartlett, 1988.) This is another instance of the trend in which health care providers are moving away from self-employment. Data on optometrists graduating during the middle 1970s had indicated a reverse trend towards solo practice. The reasons for changing practice preferences from self-employment to working for others are numerous and have been well documented and include competition, third-party reimbursement mechanisms, and indebtedness of graduating health practitioners.

Optometric Practice

The scope of optometric practice continues to expand. In 1982, 34 States permitted optometrists to utilize drugs for diagnostic purposes; now, all States allow optometrists to use drugs for diagnostic purposes. In 1982 only two States authorized optometrists to use topically applied drugs for therapeutic purposes; today, 23 States allow optometrists to use drugs for the management and treatment of ocular diseases.

Based on data collected by the American Optometric Association since 1979, the average net income of optometrists rose at a compounded rate of 4.4 percent a year, from $42,300 in 1979 to $57,200 in 1986 (AOA, 1988a). During the 4 most recent years from 1982 to 1986, the growth in mean net income was somewhat greater (5.2 percent), from $46,800 to $57,200. Incomes varies with the maturity of practices and generally peaks by the ninth year.

Third party vision care plans have grown rapidly in recent years and are increasingly important to optometrists' income. In 1986, from one-fourth to one-third of optometrists' practice income resulted from either governmental third party payment (for example, Medicaid, Medicare, CHAMPUS) or from non-governmental third party payment (such as vision service groups, insurance, and union plans), according to data from the American Optometric Association. This proportion had risen from less than one-fifth of optometrists' practice incomes 6 years earlier and probably has increased even more since 1986.

Educational Developments

Enrollments and Graduates

Optometrists receive extensive undergraduate and graduate level professional education. More than three-fourths of all entering optometry students have completed 4 or more years of college prior to entering schools of optometry. The 4-year professional degree program involves specialized classroom and clinic training in all phases of functional vision care, optics, and eye health.

In 1987-88, 16 schools and colleges of optometry enrolled 4,646 students, an increase of only 10 students from the previous year's enrollment. The number of graduates in 1987-88 was 1,106 (ASCO, 1988b). The number of graduates in recent years has been fairly stable; the highest number was 1,172 in 1984. However, first-year enrollments, 1,268 in 1987-88, have increased 13 percent over the level of enrollment, 1,120, 5 years earlier. The first-year enrollment in the 1982-83 academic year was the lowest in the 1980s.

Women continue to enter the profession of optometry in increasing numbers. Between 1971-72 and 1987-88 total student enrollment in schools and colleges of optometry increased 48 percent, but the total enrollment of women increased twelve-fold, rising from 112 to 1,518.

Between 1981-82 and 1987-88, the number of women entering optometry schools increased from 436 to 540, about a 6.5 percent increase in the proportion of entering classes. In 1987-88, 43.8 percent of the entering class were women. This proportion compares with 32.2 percent in 1981-82 and 14.3 percent in 1975-76. This substantial increase in numbers of women enrolled is reflective of both increased interest and increased acceptance within the profession.

Ethnic minorities have historically been underrepresented within optometry. However, minority group enrollment during the most recent 5-year period increased from 11 percent of total enrollment in 1981-82 to 17.1 percent in 1987-88. This compares with minority representation of 8 percent of total enrollment in 1975-76. This doubling of the percentage of minorities enrolled was accompanied by a more than doubling of the total numbers from 309 to 772. Changes in the numbers enrolled for each minority group differed substantially, however. Students with Spanish surnames increased from 55 in 1975-76 to 119 in 1987-88, a 116 percent increase. Asian-American students increased from 166 in 1975 to 410 12 years later, an increase of 145 percent. The number of Black students enrolled remains small, but increased from 83 in 1975-76 to 137 in 1987-88, a 65 percent increase.

Educational Preparation

Eight of 16 schools of optometry require only 2 years (60 semester hours) of pre-optometry preparation for entry eligibility. All others require 3 years (90 semester hours). The majority of students in 1987-88, however, had completed 4 years or more of undergraduate preparation before entering optometric education. This proportion was more than 75 percent in the 1987-88 academic year. Compared with 1975-76, there has been a particularly large reduction in the acceptance of students with 2 years pre-optometry, the percentage dropping from 17.6 in 1975 to an average of 4.1 percent in 1987-88.

During the 1987-88 academic year 65 percent of entering students were from States with a school of optometry and 49 percent of these students attended the school within their State of residence. In general, students from States without schools of optometry attended schools that have contract arrangements with their State of origin. Although, subsidization of nonresident tuition may be a significant factor in applying to the profession, 22 percent of students from States with a school attended an out of State institution during this academic year.

Indebtedness of Optometry Students

Based on a survey conducted by Association of Schools and Colleges of Optometry (ASCO), the average indebtedness of an optometry student graduating in 1987 was $33,600 (ASCO, 1988a). (If students reporting no educational indebtedness are excluded, the average total educational indebtedness for fourth year students was $36,600.) Male students averaged $35,300; female students averaged $30,400. The differential between average indebtedness of private school and public school graduates was approximately $10,000. Students graduating from private schools averaged $37,800 in indebtedness and those graduating from public optometry schools averaged $28,100. Trend data show that, overall, student indebtedness is increasing from one year to the next.

The ASCO survey showed decided differences in students' expectations of levels of indebtedness upon graduation. The 1990 graduating class enrolled at private institutions expected to borrow a significantly larger amount than those who had graduated only a few years earlier from these same institutions. Students enrolled in public institutions expected less indebtedness than those graduating 4 years earlier.

Optometric Residency Programs

Optometric residency programs are relatively new, having begun in the mid-1970s and have increased to a total of 67 programs in various curricular areas within optometry in 1988. They offered a total of 110 positions in 1988. A residency program is defined by the Council on Optometric Education (COE) as an academic post-graduate program of prescribed length and content, usually in an area of specialization, which is available to fully qualified practitioners. A residency program is clinical in content, and has as its goal the development of relevant skills and competence in specific areas including an advanced body of knowledge that can not be effectively covered in the basic 4-year professional program.

Initially, residency programs were accredited by COE only in the areas of pediatric optometry, rehabilitative optometry, and hospital-based optometry. However, over time new areas were developed. These additional areas include family practice optometry, primary care, geriatric optometry, contact lenses, and low vision. Specific admission requirements vary from institution to institution and from one residency program to another; however, all programs require the applicant to be a graduate of an accredited school or college of optometry.

A Look Ahead

Projections of Future Supply

The number of optometrists is expected to increase substantially in the coming years. Three different sets of projections of the supply of active optometrists between the years 1988 and 2020 are presented in this report. Each rests upon different assumptions regarding the number of students to be graduated during the projection period.

Estimates of future enrollments in and graduations from schools of optometry are critical to projections of overall supply in the profession. The basic and other projection series assume that the increase in the proportion of women enrolling in schools of optometry will continue until 1990 when enrollment of men and women will be approximately equal.

All three sets of projections assume that the 16 schools of optometry operating in academic year 1987-88 will remain open. It is also assumed that the two most recently opened schools, Northeastern Oklahoma State and the University of Missouri at St. Louis, will continue to maintain their initial first-year enrollment through the projection period. It should also be noted that graduates of the Inter-American University School of Optometry in Puerto Rico are not included in the future supply estimates. Evidence from other health professions shows that graduates of Puerto Rican schools tend to remain in the Commonwealth.

Basic Series

The basic supply projection series (the most likely of the three projections) assumes that first-year enrollments will be maintained at the level achieved in 1987-88, and that one new school will open during the projection period. (It is assumed that the Illinois College of Optometry will open a branch campus in St. Petersburg, Florida with a first-year class with an initial enrollment of 35.) Although there has been some decline in applicants, the number continues to be substantially greater than the number of new admissions. In addition, substantial stability in first-year enrollment has been demonstrated in the 3 most recent academic years. This projection assumes that present enrollments will be maintained through a combination of State, local, and other support to optometry schools. It is also assumed that tuition will cover a greater proportion of educational costs.

In the basic series first-year enrollments are projected to increase from the 1987-88 level of 1,234 to 1,269 in 1990-91 and remain at that level through the projection period. Graduates are projected to gradually increase from 1,108 in 1987-88 to 1,205 in 1994 and remain at that level for the balance of the projection period. The total number of new graduates entering the work force between 1988 and the year 2000 is expected to be 15,300, which would account for 46 percent of all optometrists active at the end of the century. Between 2001 and 2020 an additional 24,100 graduates of schools of optometry are projected. By the year 2020 more than 94 percent of the active supply of optometrists will have graduated after 1987.

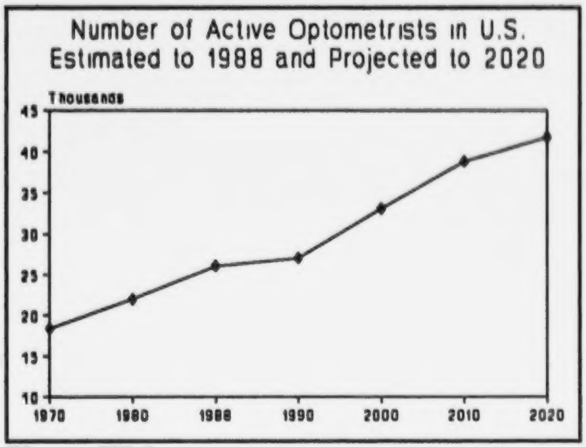

Figure XI-1

The projected average annual number of graduates during the 1988-2000 period would be 1,180--nearly twice as many as the average annual loss expected from death and retirement (606). Between 2001 and 2020 the average annual number of graduates projected is 1,205, 55 percent more than the average loss from death and retirement (777). The supply of active optometrists would increase 27 percent between 1988 and 2000 from 26,100 to 33,100 (figure XI-1). Growth between the years 2000 and 2020 would be about the same. The number of active optometrists is projected to increase to 41,700 in the year 2020, 60 percent over current supply.

The ratio of active optometrists to population, 10.6 per 100,000 in 1988, is projected to increase to 12.3 in the year 2000 and 14.2 in the year 2020.

Because of increased enrollments of women, growth in the number and proportion of female optometrists is expected to be substantial. The number of active women optometrists is projected to increase from 3,000 or 11.5 percent of the active supply in 1988 to 9,400 or 28.4 percent of the active supply by the year 2000 (figure XI-2). In the year 2020, women are projected at 18,000 active optometrists or 43.2 percent of the active supply.

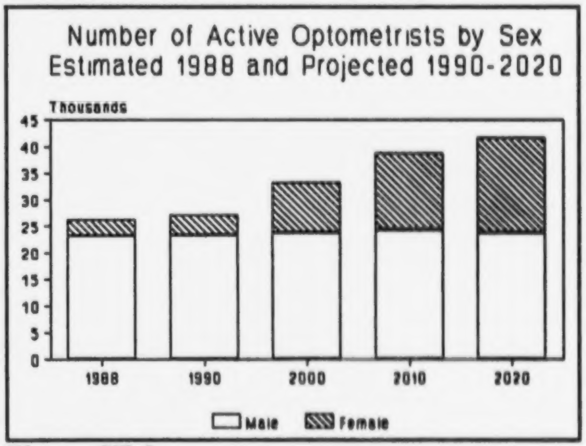

Figure XI-2

Low Alternative Series

The low alternative series assumes that the decreases in first-year enrollments in the early part of the 1980s will occur through the early 1990s. This series assumes a level of decline in first-year enrollments in existing schools of 2.5 percent annually from 1988 to 1992. It is then assumed that the 1992 level of enrollment will remain constant to the end of the projection period with the addition of one new school in 1990. It is also assumed that changes in the male-female distribution of first-year enrollees in recent years will continue until enrollment by sex reaches parity. Based upon these assumptions, graduates are projected to decline from 1,049 in 1987 to 997 in 1994 in the low series, remaining at this level to the end of the projection period. The total number of graduates between 1986 and 2000 is projected to be 15,200 or about 5 percent less than the basic series.

In this series the number of active optometrists would rise to 32,200 in the year 2000 and 38,100 in the year 2020 resulting in a ratio of 12.9 active optometrists per 100,000 population. In the year 2020, 16,200 active female optometrists are projected in this series or 42.5 percent of all active optometrists.

High Alternative Series

The high alternative series assumes that the average annual level of increase in first-year enrollment in the most recent academic years, between 1984-85 and 1987-88, will continue to 1992-93, but at a slower pace. This series assumes enrollment maintenance, through a combination of State, local, and other support. It is assumed that a 5 percent increase in enrollment will take place over a 5-year period; the average annual increase in first-year enrollment is therefore assumed to be 1 percent. After 1992 it is assumed that first-year enrollment by sex will be maintained at approximately equal levels. In the high series, graduates are projected to increase from 1,021 in 1988 to 1,112 in 1992 and to 1,167 in 1995 and beyond. The total number of graduates between 1986 and 2000 would be 16,700 or about 4 percent more than the basic series.

According to high series estimates, the number of optometrists would rise to 33,800 in the year 2000 and to 45,300 in the year 2020 for a ratio of 15.4 active optometrists per 100,000 population. In the year 2020 the number of women in optometry in this series is projected to be 19,800 or 44 percent of all active optometrists.

Requirements for Future Practitioners

It continues to be difficult to assess changes in the requirements for optometrists because there is little information on the productivity of optometrists or on the number of patients treated since the early 1980s. However, a 1982 Report of the American Optometric Association's Task Force on Optometric Manpower concluded that 34,300 or 14.1 practicing optometrists will be needed in 1990, based upon expected prevalence of conditions requiring care, distribution of probable treatment modes for each condition, and average time necessary to deliver care. By the year 2010, 39,800 active optometrists would be required to deliver services, given expected increases in the population. Similarly, to maintain this level of care, the number of practicing optometrists of active optometrists that would be required in the year 2020 would be 41,500.

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Table XI-A-1. NUMBER OF ACTIVE OPTOMETRISTS AND OPTOMETRIST-TO-POPULATION RATIOS: SELECTED YEARS, ESTIMATED 1970-1988, AND PROJECTED 1990-2020[1]

Year	All active optometrists[1]	Total population (thousands)	Active optometrists per 100,000 total population[2]
1970	18,400	206,466	8.9
1980	22,200	228,976	9.7
1988	26,100	247,284	10.6
1990	27,100	250,410	10.8
Low	27,100	250,410	10.8
High	27,100	250,410	10.8
2000	33,100	268,266	12.3
Low	32,200	268,266	12.0
High	33,800	268,266	12.6
2010	38,800	282,575	13.7
Low	36,500	282,575	12.9
High	41,000	282,575	14.5
2020	41,700	294,364	14.2
Low	38,100	294,364	12.9
High	45,300	294,364	15.4

1/ The basic methodology was use for the projections shown for the years 1988 through 2020; alternative assumptions were used for the low and high projections. includes optometrists in Federal services.

2/ Ratios are based on total population, including Armed Forces overseas, as of July 1 for 1990 and succeeding years.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

U.S. Bureau of the Census. Current Population Reports, Series P-25, Nos. 977 and 1018.

Table XI-A-2. NUMBER OF ACTIVE OPTOMETRISTS, BY SEX: ESTIMATED 1988, AND PROJECTED FOR SELECTED YEARS, 1990-2020[1]

Year	Number of active optometrists	Male optometrists	Female optometrists	Percent females of all optometrists
1988	26,100	23,100	3,000	11.5
1990	27,100	23,300	3,800	14.0
2000	33,100	23,700	9,400	28.4
2010	38,800	24,300	14,500	37.4
2020	41,700	23,700	18,000	43.2

1/ The basic methodology was used for all of these projections. Includes optometrists in Federal service; excludes optometrist in U.S. Possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health professions, Divsion of Associated and Dental Health Professions.

Chapter XII

PHARMACY

Introduction

Pharmacy continues to find itself in the midst of change brought about by societal concerns about use and misuse of drugs and the professions' response to those concerns. Two decades ago the traditional role of the pharmacist was almost solely that of preparation of the drug product; the transfer of drug information to the patient was the responsibility of the prescriber. Today, the pharmacist increasingly is the source of drug information and expertise for patients. The pharmacist is not only responsible for delivery of the drug, but, more importantly, is involved in the selection, monitoring, and evaluation of the appropriate drug as well as providing drug information to the patient and to other health professionals. The literature contains numerous articles that address the efficacy and benefit of the pharmacist's involvement in drug therapy regimens.

Developments in Supply

Current Supply

There were an estimated 157,800 active pharmacists in the United States in 1988, an increase of 40 percent since 1970 and 56 percent since 1960. The estimated growth in the active supply of pharmacists has decreased to less than 1 percent a year for the last four years compared to an estimated annual growth rate of 2.4 percent in 1980 and 3.4 percent in 1975. As a result, the number of active pharmacists per 100,000 total population has increased only slightly from 62.6 in 1980 to 63.8 in 1988. In 1975 the ratio was 56.1 active pharmacists per 100,000 total population.

In 1988 the majority of pharmacists, nearly two-thirds of the active supply, worked in a community setting for chain drug stores (which includes, for the purpose of this chapter chain drug stores, supermarkets and discount stores containing pharmacies) and independent pharmacies. Hospitals, utilizing approximately one-fifth of all pharmacists, were the second largest employers. The remaining active pharmacists worked in a variety of other settings including academia, Federal government, long term care facilities, industry, State and local government, professional associations, and pharmaceutical wholesalers.

Women

There has been a significant growth in the number of women pharmacists. In 1950 only 4 percent of active pharmacists were women (figure XII-1). By 1988 that proportion had risen to over 26 percent, an upward trend expected to continue. In 1963-64, 13 percent of students enrolled in the final three years in colleges of pharmacy were women. By the 1987-88 academic year women comprised 60 percent of the total enrollment in entry level degree programs.

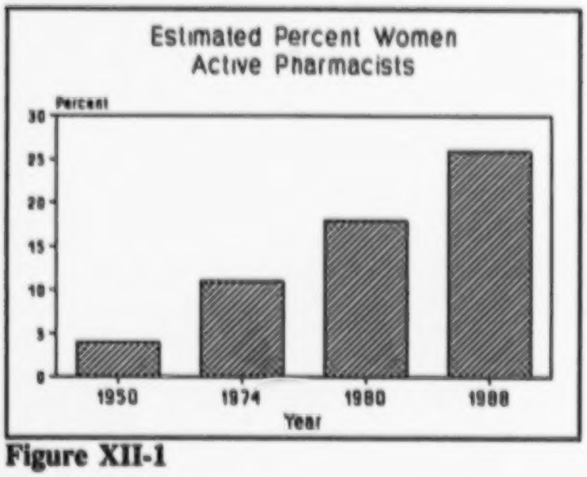

Figure XII-1

According to the recent Schering Report X "A Profession in Transition: The Changing Face of Pharmacy," of the pharmacists surveyed, women represented 40 percent of hospital pharmacists, 34 percent of those employed by drug store chains, and 19 percent of independent pharmacists (Schering Laboratories, 1988). Although women are well represented in the workforce, disparities still exist at management levels with only 36 percent of the women reporting management status compared with 68 percent for men. This percentage should improve over time since one in five women entering the profession over the last five years has gained a managerial position, a ratio comparable to men over the same time period.

The Schering Report also found that 3 of 10 women pharmacists took time off from their careers to be mothers. Women over 40 were more likely to have taken off time for family rearing. Generally, women who reported exiting the workforce to have children returned within a year. The study also reported that women worked 9 percent fewer hours per week (42) than men (46). Adjusting for difference in hours worked the salaries of women pharmacist were not statistically different from their male counterparts. Women were paid $16.52 per hour as compared to $16.80 per hour for men.

Minorities

It is estimated that in 1988 there were 16,500 active minority pharmacists, 10.5 percent of total active pharmacists, up 4.2 percent in 1974 and 8.9 percent in 1980 (figure XII-2). The number in 1988 included 4,800 Blacks, 3,400 Hispanics, 7,700 Japanese, Chinese, and other Asians, 300 Native Americans, and 300 members of other minority groups. The number and proportion are expected to continue to increase.

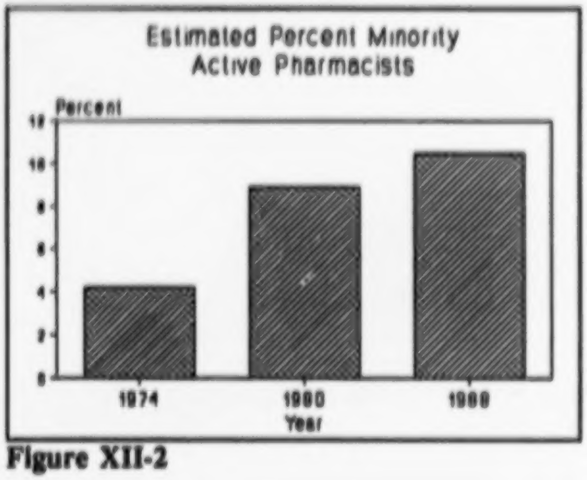

Figure XII-2

Mobility of Pharmacists

The National Associations of Boards of Pharmacy (NABP) has established reciprocity procedures to facilitate licensure transfer across states. The procedures permit pharmacists licensed in one State to transfer that license to another State without taking the entire licensure examination again. All States have authorized reciprocity except California and Florida. Reciprocity figures do not provide mobility information on pharmacists who acquire licenses in other States by licensure examination or via NABP's score transfer program. In 1976, 2,722 applications were processed by NABP for reciprocal licensure. The number of applications has increased steadily to a high of 4,367 applications processed in 1986. A slight reduction occurred in 1988 when 4,245 applications were processed for reciprocal licensure.

Foreign Pharmacy Graduates

In 1984 the National Association of Boards of Pharmacy began administering the Foreign Pharmacy Graduate Equivalency Examination (FPGEE). This permits graduates of foreign pharmacy schools who pass the FPGEE and obtain a minimum score of 550 on the Test of English as a Foreign Language (TOEFL) to be certified by NABP to take the NABPLEX (the standard examination utilized by state boards for licensure of pharmacists) examination for licensure. Currently 26 States accept NABP certification, which allows foreign pharmacy graduates to take the NABPLEX examination. Of 1375 candidates who took the FPGEE between 1984 and 1987, 848 (61 percent) passed. NABP reports that 278 (33 percent) of foreign candidates certified to take the licensure examination passed.

Career Choice of Pharmacy Graduates

Each year American Druggist surveys new graduates concerning their employment. In 1988 almost 40 percent of the respondents obtained employment in chain drug stores. The chain drug store industry had continuous growth in the proportion of new graduates hired, from 27 percent in 1979 to over 42 percent in 1987. Of the remaining 1988 graduates, 22.1 percent worked in hospitals, 18 percent chose independent pharmacies, 3 percent joined manufacturers, 9.1 percent continued on to graduate study, and 8.7 percent chose government, other career fields, or were undecided.

Educational Trends and Developments

Enrollments

An entry level degree is a requirement for U.S. citizens to become eligible to take a licensing examination. Schools and colleges of pharmacy provide two entry level degrees, a five-year baccalaureate or a six-year Doctor of Pharmacy (Pharm.D). Individuals with baccalaureate degrees in pharmacy may earn a Pharm.D. as a graduate level degree. Of the 74 schools and colleges of pharmacy seven offer the Pharm.D. as the only entry level degree, 31 offer both a baccalaureate and a Pharm.D. as an entry level degree, and the remainder award only a baccalaureate degree as the entry level degree.

The American Association of Colleges of Pharmacy (AACP) compiled demographic information on the 8,000 students enrolled in the first professional year in the fall 1987. Thirty-two percent of students had 3-4 years of previous college course work, 16 percent held baccalaureate degrees, and one percent held a graduate degree.

All pharmacy schools require five academic years of study for the baccalaureate degree and six years for the Pharm.D., although the amount of preprofessional college study required varies from two years to none depending on the school. Thus, enrollment data include only data on the final three years of study, the only period of pharmacy education common to all schools. Accordingly, new students are usually defined in terms of "third-to-last-year" enrollees rather than the more familiar "first-year" enrollees. Approximately one of every seven students who enrolls in the third-to-last year program will not graduate.

Two new pharmacy schools opened during academic years 1986-87 and 1987-88, Campbell University and Southeastern College of Pharmaceutical Sciences respectively, bringing the total to 74 schools. In 1987-88 the 74 schools and colleges of pharmacy (including Puerto Rico) enrolled 21,424 students in the final three years of the entry level programs, a 14.9 percent increase since 1984-85. Third-to-last year enrollments totaled 7861 students in 1987-88 (figure

XII-3), an increase of 3 percent over 1986-87 and 19.6 percent since 1982-83. Although enrollment levels in schools are substantially above the level of the late 1960s, they are below the peak level of 1974-75. Enrollments are continuing to increase after the sharp declines of the late 1970s and the early 1980s.

Entry level Pharm.D. degree program enrollments continue to increase. As a proportion of total entry degree enrollments, they have grown from 6.5 percent in 1980 to 12.7 percent in 1987.

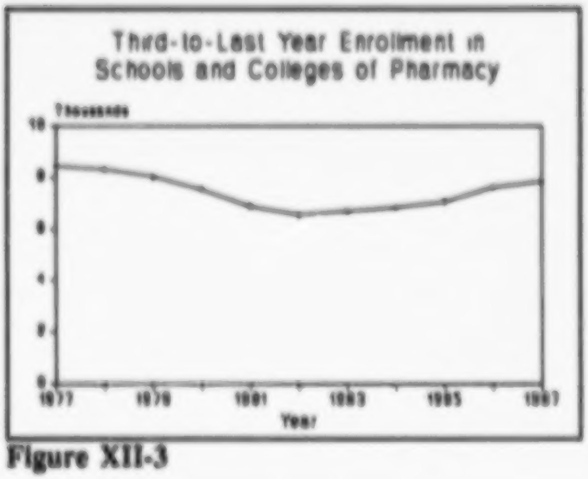

Figure XII-3

Women

The number and proportion of women continues to increase. In academic year 1987-88, 12,636 women were enrolled in the final three years of entry degree program. At the same time 4,655 women were enrolled in the third-to-last year, 59.2 percent of the class enrollment (figure XII-4). In contrast, women accounted for only 21.7 percent of third-to-last year enrollments in 1969.

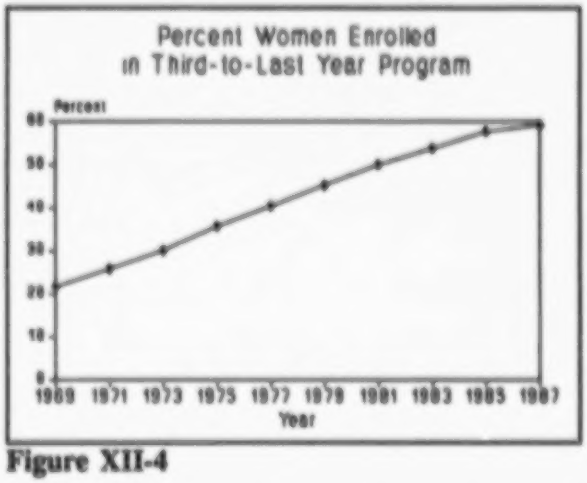

Figure XII-4

Minorities

The proportion and number of minority students enrolled in recent years continues to grow modestly. The proportion of Black students in the third-to-last year pharmacy program increased from 4.3 percent in 1978-79 to 5.8 percent in 1987-88; at the same time, Hispanic students increased from 1.9 percent to 3.6 percent in 1987-88. The number of Native American students continues to be small, increasing slightly from 11 in 1978 to 16 in 1987. However, Asian enrollment in third-to-last year nearly doubled, from 3.8 percent in 1978-79 to 7.9 percent in 1987-88. In the aggregate, third-to-last year minority enrollment increased from 10.5 percent in 1978-79 to 17.5 percent in 1987-88.

Graduates

Pharmacy schools awarded a total of 5,160 baccalaureate and 695 entry level Pharm.D. degrees in 1986-87, a slight increase over the 5,800 entry level degrees awarded in 1985-86. The number of entry level degrees conferred in 1986-87 were affected by two schools, Illinois and Tennessee, converting to all entry level Pharm.D. programs. Their conversion to all Pharm. D. programs reduced the number of graduates by eliminating that year's graduating class. Although the number of entry level degrees conferred continues to increase, it is far below the peak of 8011 in 1976-77 (figure XII-5).

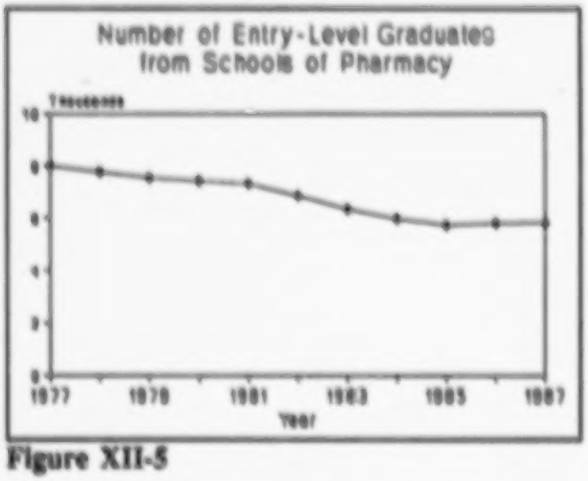

Figure XII-5

In 1986-87, 3,328 women were conferred entry level degrees (figure XII-6), 57 percent of the total, compared with 3,152 the previous year and 2,648 in 1977. Three hundred and six Black students received entry level pharmacy degrees, a 2.3 percent decrease from the previous year, while 258 Hispanic students received entry level degrees, an 18.9 percent increase over the previous year. Entry level degrees awarded to Asian students increased 11.7 percent to 372 and eight Native Americans were awarded entry level pharmacy degrees in 1987.

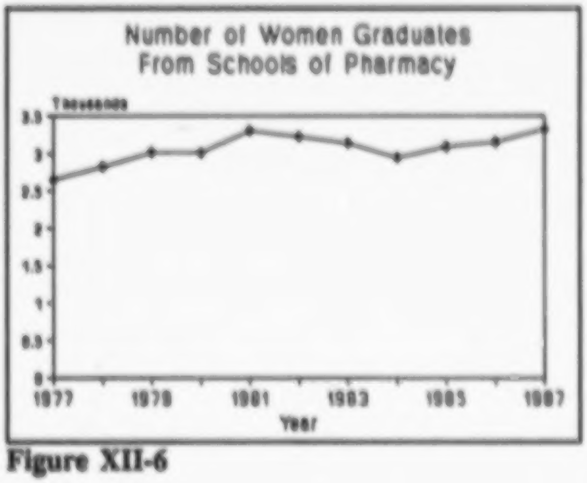

Figure XII-6

Cost of Attaining a Pharmacy Degree

Cost of obtaining a pharmacy degree increased an average of 47 percent between the 1983-84 and 1986-87 academic years according to data from the American Association of Colleges of Pharmacy. Average annual cost of public pharmacy school tuition and fees rose 37 percent to $3,081 while private college tuition rose 56 percent to $6,818. Sixty percent of all pharmacy students relied on some form of financial aid, and the average loan was $3,984 during 1986-87. Average indebtedness of a graduating pharmacy student was approximately $13,000.

From 1983-84 to 1986-87 total dollars to pharmacy students from Federal loans declined 4 percent to $30.3 million. Awards of grant funds to students increased 41 percent and totaled $12.1 million. For the same period the number of students utilizing Health Education Assistance Loans (HEAL) almost doubled while the dollar value of the average loan remained essentially constant. In 1988 there was a return of HEAL use to around the 1983-84 level.

Postgraduate Training and Pharmacy Specialties

Postgraduate training and certification in a pharmaceutical specialty provides the knowledge and skills required to fill the range and diversity of positions. Although the entry level degree program provides a sound basis for the practice of pharmacy, the complexity of pharmaceuticals and the diversity of practice settings requires pharmacists to acquire additional training. Residencies, fellowships, advanced degrees, and certification in a pharmaceutical specialty provide additional resources to meet society's pharmaceutical needs. Three currently recognized specialties are nuclear pharmacy, pharmacotherapy, and nutritional support. Besides the recognized specialties, residency and fellowship training are available in approximately 30 other areas.

Although the profession is still primarily a baccalaureate level workforce, the number of pharmacists with postgraduate training or specialization has increased. In 1979 approximately 1 percent had completed a residency or fellowship; by 1987 approximately 3 percent had completed a residency or fellowship (Knapp, in press). The number obtaining an advanced degree nearly doubled in the last ten years compared to the previous ten-year period.

Residency

According to a consortium of professional pharmacy organizations a residency is defined as an organized, directed, postgraduate training program in a defined area of pharmacy practice. Residencies exist primarily to train pharmacists for advanced practice skills and knowledge. A residency, typically 12 months or longer in duration, is directed by a qualified practitioner-preceptor. An entry level pharmacy degree is required for an individual to enter a residency.

The American Society of Hospital Pharmacists (ASHP) accredited eight new pharmacy residency programs in 1988 bringing the total to 200 accredited programs. Of the 200 residency training programs 124 are in hospital pharmacy, 39 in clinical pharmacy, and 37 in specialties. ASHP accredited its first program in 1963. Since then, over 5,000 pharmacists have completed residency training in ASHP accredited programs.

The American College of Apothecaries (ACA) started a pilot residency training program in 1986 to prepare pharmacists for management and ownership of pharmacies. ACA's initial effort has expanded to five accredited programs that provide training in community pharmacy practice. ACA residency programs are linked with pharmacy schools.

The American Pharmaceutical Association (APHA), which established its Community Pharmacy Residency Program in 1986, has nine accredited programs. The purpose of these programs is to train pharmacists for creative and innovative leadership in community pharmacy practice. APHA also has an executive residency program that trains one pharmacist a year to assume a managerial position in pharmacy related organizations at the state and national levels.

Fellowships

Fellowships are a directed, highly individualized, postgraduate experience designed to prepare the participants to become independent researchers. Drug Intelligence and Clinical Pharmacy's 1987-88 annual survey reported a total of 185 fellowships offered with 150 fellows participating in the program. Fellowships were available in 25 specialty areas with kinetics, critical care, drug development, infectious disease, pediatrics, and geriatrics accounting for the majority. Between 1981 and 1988 approximately 900 pharmacists completed fellowships.

Advanced Pharmacy Degrees

The number of graduates earning advanced degrees has continued to increase. In 1960, 131 master's degrees and 60 doctoral degrees were awarded; by 1987 this had increased to 212 postbaccalaureate Doctorate of Pharmacy degrees, 348 master's degrees, and 283 doctoral degrees. Since 1960 a total of 8,596 master's degrees and 4,526 doctoral degrees have been awarded. Since 1973, the first year that a postbaccalaureate degree was awarded, 2,948 Pharm.D. degrees have been awarded.

Pharmacy Specialization

The Board of Pharmaceutical Specialization (BPS) evaluates petitions for specialty recognition. In 1988 BPS recognized two new areas of specialization for pharmacists, pharmacotherapy, and nutrition support. Nuclear pharmacy, the first specialty to be recognized (1978), is the only other specialty practice recognized by BPS. The first certifying examination in nuclear pharmacy was administered in April 1982, and since that time 112 pharmacists have become board certified.

Projections of Future Supply

The number of active pharmacists is expected to continue to increase. Three different sets of projections for the supply of active pharmacists between the years 1988 and 2020 are presented here. Each is based upon different assumptions regarding the number of entering students who will graduate during the projection period. All enrollment projections assume that the 74 existing schools of pharmacy will continue to operate. All projections further assume that the trend toward increased enrollment of women in third-to-last year classes will level off at the current rate of approximately 60 percent. Average completion rates for men and women entering third-to-last classes are expected to continue at the rates observed in recent years.

Basic Series

Projections of student enrollments and graduations are critical for determining projections of overall supply in the profession. The basic (or most likely) series of supply projections assumes that all existing schools will remain open and that, on average, they will be able to maintain a growth rate in enrollment levels of 2.5 percent annually until 1992. Since the percentage of female enrollments has grown relatively little in recent years, it is assumed that female third-to-last year enrollments has stabilized and will continue at the level of the most recent academic year. The basic series assumes that changes in third-to-last year enrollments beyond 1992 will depend on changes in the size of the 18 to 22 year-old age group. This projection is predicated on the assumption that present enrollments will be maintained through a combination of State, local, and other support.

Table XII-1

Number of Active Pharmacists and
Pharmacists-to-Population Ratios: Selected Years
Estimated 1970-1988, and Projected 1990-2020

Year	All Active Pharmacists	Total Population (thousands)	Active Pharmacists per 100,000 Total Population
1970	112,600	206,466	54.5
1980	142,400	228,976	62.2
1988	157,800	247,284	63.8
1990	161,600	250,410	64.5
2000	181,400	268,266	67.6
2010	200,500	282,575	71.0
2020	213,800	294,364	72.6

In the basic series the total supply of pharmacists is projected to increase 15 percent from 157,800 in 1988 to 181,400 in the year 2000 and to increase another 18 percent to 213,700 by the year 2020 for a net increase of 55,900, 35 percent over the projection period (table XII-1). The average annual growth will be somewhat greater between 1988 and 2000 (1.2 percent) than between 2000 and 2020 (0.9 percent) due to increasing retirement rates.

The ratio of active pharmacists per 100,000 population is projected to increase from 63.8 in 1988 to 67.6 in the year 2000 and to 72.6 in the year 2020. The median age of active pharmacists is expected to rise from 39.9 years in 1988 to 40.8 years in 2000 and then to decrease to 40.2 years in 2020.

Substantial growth in the number of women pharmacists will account for all expected growth in the active supply. The number of female pharmacists is expected to grow from 41,800 in 1988, to 69,500 in 2000, and to 105,900 in the year 2020 (figure XII-7). The number of men is expected to decline from 116,000 in 1988 to 111,900 in the year 2000 and to 107,900 in 2020. Women comprised 26 percent of the active supply in 1988, and they are projected to be 38 percent by the end of the century and nearly half by the year 2020.

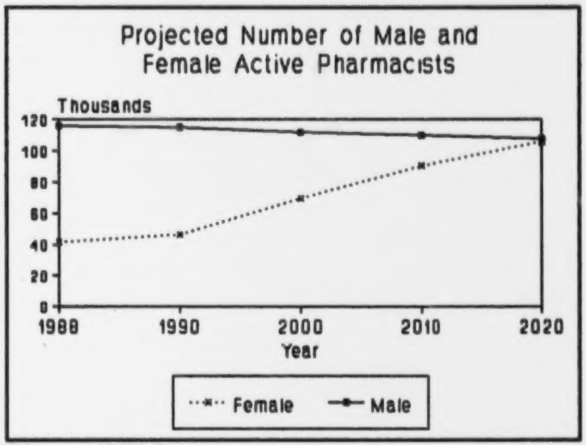

Figure XII-7

The effect of this increasing proportion of female pharmacists on the overall availability of pharmacy services cannot be predicted exactly. The National Inventory of Pharmacists: United States, 1978-79 indicated that, on the average, female pharmacists work 85 percent of the hours worked by male pharmacists. In (Knapp, 1987) male pharmacists worked an average of 42 hours per week, while female pharmacists worked an average of 36.9 hours or nearly 88 percent of time worked by male pharmacists. The Schering Report X found that male pharmacists worked an average of 46 hours per week, and female pharmacists, an average of 42 hours per week or nearly 91 percent of time worked by male pharmacists.

Although the percentage difference in number of hours worked is decreasing, this difference will likely affect the full-time equivalent (FTE) pharmacists aggregate numbers (table XII-2). If female pharmacists provide 91 percent of the FTE services of male pharmacists, in any given year, the following table demonstrates how changes in the aggregate number of pharmacists might translate into changes in full-time equivalent pharmacists.

Table XII-2

Estimated Full Time Equivalent Supply of Pharmacists

Year	Total Active Supply of Pharmacists	Total Female Supply Pharmacists	FTE Supply of Pharmacists
1988	157,800	41,800	154,000
1990	161,600	46,500	157,400
2000	181,400	69,500	175,100
2010	200,500	90,500	192,400
2020	213,800	105,900	204,300

Low Alternative Series

The low alternative series assumes that third-to-last year enrollments will stabilize at existing enrollment levels. It assumes that all existing schools will remain open and that enrollments will remain at the level achieved during the most recent academic year until 1990-91. After that year it assumes that enrollment level changes will be proportionate to the changes in the 18 to 22 year-old population. In the low scenario, the number of active pharmacists is projected to grow from 157,800 in 1988 to 173,900 in 2000 and to 189,000 in 2020, increases of 4 percent and 12 percent, respectively, that mean fewer pharmacists than in the basic series. Women are projected to comprise 32.1 percent of active pharmacists by the end of the century and 47.9 percent by the year 2020, also slightly less than in the basic series.

High Alternative Series

The high alternative series assumes recent growth in third-to-last year enrollments between 1984 and 1987 will continue at an average of 3.5 percent annually until 1995. This projection assumes that enrollment increases will be maintained through a combination of state, local and other support. After this period it assumes that third-to-last year enrollments will change proportionately with the numbers of persons aged 18 to 22. In this series the number of active pharmacists is projected to reach 189,200 by the year 2000 and 250,900 by 2020, a ratio of 85.3 pharmacists per 100,000 population. Of active pharmacists women will comprise 34.2 percent in the year 2000 and almost 50 percent by 2020, approximately the same as in the basic series.

Current and Future Trends in Pharmacy

Status of and Demand for Pharmacist Services

According to a recent survey by the American Society of Hospital Pharmacists, a national shortage of hospital pharmacists and technicians exists (Stolar, 1988). In 1987 there were an estimated 2,300 vacancies for pharmacists, most of which (63 percent) were at the dispensing and multiduty level, and 960 vacancies for technicians. The vacancy rate for all hospital pharmacists was 5.2 percent, of which 14 percent were clinical positions. The survey also found that hospitals expected to create 1,600 new jobs for pharmacists and 1,670 new jobs for technicians. Need for pharmacists was lowest in the East South Central and Pacific regions and highest in the Mid-Atlantic and Mountain regions. Need for technicians was lowest in the East North Central and West North Central regions and highest in the New England and South Atlantic regions.

A September 1987 survey of hospital pharmacy directors (Stubson and White, 1988) found that 38 percent had experienced difficulty in filling staff positions in the past year. Only 73.8 percent of new staff positions could be filled. Directors found fewer applicants and, in some situations, no applicants for positions despite heavy advertising in newspapers in the area. Salary and better working conditions were cited as the major reasons leaving a position. Hospital staff pharmacist turnover rates were high at 22.7 percent.

The National Association of Chain Drug Stores (NACDS) commissioned the University of North Carolina at Chapel Hill to perform a national survey of pharmacy manpower in chain drug stores (Mackowiak et al., 1989). The survey found that approximately 81 percent of respondents had at least one open position and 40 percent had at least one part-time position available in their chain. The 78 responding chain drug stores reported 565 full-time and 112 part-time unfilled positions, a 3.1 percent vacancy rate, a rate that was larger in the smaller (less than 50 pharmacies) chains. According to projections in the survey, if the 3.1 percent vacancy rate is constant for NACDS, an additional 1,793 pharmacists will be needed.

A State specific study (Phillips et al., 1989) of independents, chains, and hospital practice sites in North Carolina found 289 sites (19 percent) reporting full- or part-time vacant positions. Independents reported 16 percent vacancy rates, chains 19 percent, and hospitals 37 percent. Vacancies reported for 255 full-time (236 being actively recruited) and 131 part-time (107 being actively recruited) positions. This is an estimated 289 full-time equivalent pharmacists, a 7 percent vacancy rate. In 1987, 144 pharmacy students graduated from the University of North Carolina.

Newspaper and pharmacy professional journals have shown a marked increase in the number of job advertisements and levels of benefits for pharmacists (Paavola, 1989). In a review of selected newspapers across the United States the total number of advertisements, which included full-time, part-time, and multiple positions, increased from 298 in July 1978 to 411 in July 1983 (38 percent increase). Advertisements nearly doubled from 411 in July 1983 to 806 in July 1988. The advertisements in 1988 included higher salaries, sign-up bonuses, paid relocation, and interviewing expenses.

Data collected by the Bureau of Health Professions for pharmacists employed by the Federal government, which includes the Air Force, Army, Navy, Public Health Service and Department of Veterans Affairs showed 4,914 pharmacist positions in 1988. Of these 4,565 were filled and 349 (7.1 percent) were vacant.

Current Requirements for Pharmacists

Forecasting requirements for pharmacists, difficult under the best circumstances, are hampered by lack of current data. The most recent national data on productivity and distribution of services is now a decade old. Because the characteristics of pharmacy practice vary by setting and change over time, it is essential that requirements estimates account for these differences. For the purpose of this report current requirement estimates will be produced for different settings (Manasse, 1988).

> *__Independent Community Pharmacists.__ There are approximately 33,000 independent community pharmacies. According to the 1988 Lilly Digest the typical community pharmacist filled approximately 8.0 prescriptions per hour, and the pharmacy filled 29,333 prescriptions per year, equating to 3,732 pharmacist hours needed annually. If the average pharmacist worked 40 hours per week, 50 weeks per year, 1.83 pharmacists would be needed for each store requiring 60,400 pharmacists to be employed in community pharmacies. The National Association of Retail Druggists works with the premise that most independents employ 1.75 pharmacists per store. Most articles state that pharmacists work more than 40 hours per week; therefore, 1.75 pharmacists per store will be used. This would require 57,800 pharmacists for the independent community setting.*
>
> *__Chain Pharmacists__ There are approximately 27,000 chain pharmacies in the United States, including supermarkets and discount stores, according to Chain Drug Review. The average chain store pharmacy in 1987 filled 33,320 prescriptions. The assumption that the average chain pharmacist filled 8 prescriptions per hour as did independent pharmacists would require 4,165 hours annually. If the average pharmacist worked 40 hours per week, 50 weeks a year, 2.08 pharmacists would be needed for each store. The National Association*

of Chain Drug Stores works with the premise that, to open a chain store, 2.5 pharmacists are needed to provide coverage. Using the more conservative number, 56,200 pharmacists would be needed for chain pharmacies.

Hospital Pharmacists. *There are approximately 5,600 short-term, nonFederal hospitals. Using the 1987 Lilly Digest Hospital Pharmacy Survey the average hospital employed 7.2 full-time equivalent pharmacists. This would require 40,300 pharmacists needed for the nation's hospitals.*

Long-Term Care Pharmacists. *Long-term care facilities include nursing homes, mental institutions, hospices, prisons, and residential care facilities. Very little is known about pharmacists who provide services to these facilities. Some pharmacists may be employed in another setting, some may be totally in a consultant role, and others may be employed by the facility. The 1978 Inventory of Pharmacists listed 1,551 pharmacists employed in nursing homes. Factoring for growth it is estimated that at least 2,000 pharmacists would be required for this sector.*

Education. *The American Association of Colleges of Pharmacy maintains a Roster of Teaching Personnel in Colleges and Schools of Pharmacy. Approximately 3,000 of the faculty personnel have a pharmacy background.*

Government. *The Federal Government employs approximately 4,900 pharmacists.*

Industry. *Very little is known about the number of pharmacy graduates who chose the pharmaceutical industry as a career. Pharmacy graduates have the educational background to meet the needs of the pharmaceutical industry (Lucisano, 1988). Starting with the base of 2,479 pharmacists employed by pharmaceutical manufacturers (as listed in the 1978 Inventory of Pharmacists), adding to that the number of pharmacy graduates who state preferences to work for manufacturers as a career, and applying BHPr death and retirement rates, it is estimated that pharmaceutical manufacturers require at least 3,700 pharmacists.*

Others. *Others includes pharmacists employed by State and local governments, professional associations, wholesalers, and other sectors not addressed in the above sections about which very little is known. A 1973 inventory showed 1,299 pharmacists employed by State and local government. Factoring for growth in these sectors it is expected that at least 2,000 pharmacists would be required.*

Combining the requirements for each of the different sectors, estimated minimum number of pharmacists required is 169,900. When estimated requirements are compared with projected supply of pharmacists (157,800), current requirements exceed expected supply.

Future Requirements

Future requirements for pharmacists are even more difficult to predict. The profession continues to change influenced by a variety of internal and external forces (Shepherd et al., 1986). Internal changes are driven by the expanded role that pharmacists are undertaking, which includes fulfilling the role as drug expert, providing drug information to health care providers, and drug counseling to patients. The pace of change is dependent upon reimbursement and training issues. The number of prescriptions written in any given year is a function of services rendered, professional medical judgement, prevalence of disease and dysfunctions, and demography. A most important factor is the number of elderly persons seeking care since one in four prescriptions are written for persons 65 or older (Business and Health, April 1987). Because an estimated 1.8 billion prescriptions are filled annually, any change in these factors will affect the number of pharmacists required.

Many external forces influence the profession such as computer and automated dispensing systems as well as information processing systems. The pharmaceutical manufacturing industry also develops new drug delivery systems and drugs for treatment of known and new diseases as they arise.

Legislation affects the scope of pharmacy services. The drug benefit portion of the Medicare Catastrophic Health Care Act provides for patient counseling and maintenance of prescription profiles. This program also will pay a percentage of prescription drug costs after the beneficiary has met a yearly deductible.

Productivity enhancements via use of pharmacy technicians also affect requirements for pharmacists. Use of pharmacy technicians in performing routine tasks permits the pharmacist to increase productivity and involvement in drug product control. Hospitals, mail service pharmacies, and some chain pharmacies utilize technicians.

Other factors affecting future requirements for pharmacists are the extent to which physicians dispense prescription drugs as part of the clinic visit, ability of third party and managed health care programs to control beneficiaries' uses of non-member pharmacies, and growth in direct mail service pharmacies.

The Bureau of Labor Statistics predicts the job outlook for pharmacists will be excellent. Growth is expected in hospitals and demand for pharmacists is forecast to be strong in the community setting. BLS estimates that if current supply-demand trends continue spot shortages are likely to occur.

Other Trends in Pharmacy Practice

Pharmacist Salaries

The average base salary per year for pharmacists increased by 31 percent from $27,100 in 1982 to $35,600 in 1987 (Drug Topics, 1987). The highest salaries were reported in hospitals ($38,200) followed by chains ($38,000) and independents ($33,600). Salaries increased gradually to a peak between the ages of 36 and 45, then declined. Hospital pharmacists worked 41.5 hours per week compared to 42.6 for chains and 43.9 for independents.

Patient Counseling

An important aspect of the pharmacist's scope of responsibility is the provision of information to patients about their medications. At least 16 States require some form of counseling of patients by a pharmacist. In 1974 Washington became the first State to require pharmacists to explain to a patient receiving a new prescription the correct use of the drug. Patient counseling is often not practiced or enforced in many States that do require counseling (Drug Topics, 1988). In order to improve patient/pharmacist counseling, the pharmacist must develope relevant skills and have time and place to allow the private exchange of information. The Indian Health Service (IHS), at the forefront of patient counseling, could serve as a model for others. IHS pharmacists provide counseling to all patients, in private, to insure that the patient understands the purpose of the medication, proper dosage and usage, and possible side effects.

Continuing Education

Most States require pharmacists to obtain continuing education for licensure renewal. Continuing education credit can be obtained through continuing education conferences, correspondence courses, attendance at national and local meetings and other courses approved by the state boards of pharmacy. Two States, Florida and Washington now require pharmacists to obtain continuing education on HIV/AIDS.

Pharmacy Technicians

Pharmacists utilize various personnel, including clerks, assistants, helpers, and technicians to assist them. The term pharmacy technician generally refers to support personnel who perform technical activities under a pharmacist's supervision (Ryan, 1989).

Pharmacy technicians are employed in many hospital, community and mail service pharmacies, but very little is known about how many technicians are employed. Such support personnel are found in all States in hospital pharmacies and in all but 9 States in community pharmacies. In a survey of hospital pharmacy services it was estimated that hospitals employed 35,600 technicians (Stolar, 1988). Estimates are not available on the number of technicians employed in other settings.

Pharmacy technicians are educated and trained in community colleges, vocational schools, hospitals, and military training programs as well as on-the-job. In 1988 there were 68 formal technician training programs in 19 States. The American Society of Hospital Pharmacists has accredited programs for pharmacy technicians since 1982 and currently accredits 11 of the 68 programs.

Four States (Illinois, Massachusetts, Michigan and New Hampshire) offer a certification examination for technicians; three States (Illinois, Nevada and Washington) require licensing. Eight States have set the high school degree as a minimum educational level to work as a pharmacy technician.

An invitational conference sponsored by the American Society of Hospital Pharmacists and conducted by the University of Maryland Center of Drugs and Policy in 1988 was convened to develop a consensus on pharmacy technician issues. The conferees agreed that the pharmacy profession needs to develop criteria to define technicians as well as formal education and training programs (ASPH, 1989).

Geriatrics

The Bureau of Health Professions currently funds 33 Geriatric Education Centers (GEC). Twenty-five pharmacy schools formally participate in 23 of these GEC's, which are engaged in developing educational materials, faculty, and curriculum. These programs provide essential training to faculty, students, and practitioners to meet the increasing health needs of elderly patients.

It is estimated that one-fourth of all prescriptions are written for persons 65 years of age or older, and that each elderly person receives approximately 13 prescription drugs per year. A 1985 study estimated that 243,000 elderly persons were hospitalized due to adverse drug reactions. Such figures point to the importance of the pharmacist in providing consultation to the elderly.

Drug regimens are becoming more complex, and the elderly are seeing an increasing number of specialists. Research has shown that when a pharmacist reviews drug regimens, consults with the primary provider, and provides counseling to the patient, drug utilization problems tend to decrease.

Pharmacy Manpower Data Project

In 1986 the Bureau of Health Professions funded a Pharmacy Manpower Planning Conference. This project brought together representatives of 13 of the national pharmacy organizations to reach a consensus on development of a pharmacy manpower database. From this conference, a Pharmacy Manpower Steering Committee was formed to plan and develope a manpower database through the use of private funds. As of 1988 the committee has acquired private funding and is now soliciting private contract proposals to begin data collection based upon information requested during the licensure renewal process. It will take approximately three to four years for the data to be available because of variations in the licensure renewal cycle.

Pharmacist Demand in the Chain Drug Industry

The National Association of Chain Drug Stores has funded a comprehensive study of the chain industry entitled "Pharmacist Demand in the Chain Drug Industry...1980, 1990, 2000," which should provide better information about future demand. This study is being performed by the University of North Carolina and results are scheduled for release in 1989.

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Table XII-A-1. Number of Active Pharmacists and Pharmacist-to-Population Ratios; Selected Years, Estimated 1970-1988, and Projected 1990-2020[1]

Year	All active pharmacists[1]	Total population (thousands)	Active pharmacists per 100,000 total population[2]
1970	112,600	206,466	54.5
1980	142,400	228,976	62.2
1988	157,800	247,284	63.8
1990	161,600	250,410	64.5
Low	161,600	250,410	64.5
High	161,600	250,410	64.5
2000	181,400	268,266	67.6
Low	173,900	268,266	64.8
High	189,200	268,266	70.5
2010	200,500	282,575	71.0
Low	183,800	282,575	65.0
High	224,000	282,575	79.3
2020	213,800	294,364	72.6
Low	189,000	294,364	64.2
High	251,000	294,364	85.3

1/ The basic methodology was used for the projections shown forthe years 1988 through 2020, alternative assumptions were used for the low and high projections. Includes pharmacists in Federal services.

2/ Ratios are based on total population, including Armed Forces overseas, as of July 1 for 1990 and succeeding years.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table XII-A-2. Number of Active Pharmacists, by Sex: Estimated 1988, and Projected for Selected Years, 1988-2020[1]

Year	Number of active pharmacists	Male pharmacists	Female pharmacists	Percent Female of all pharmacists
1988	157,800	116,000	41,800	26.5
1990	161,600	115,000	46,500	28.8
2000	181,400	111,900	69,500	38.3
2010	200,500	110,000	90,500	45.1
2020	213,800	107,900	105,900	49.5

1/ The basic methodology was used for all these projections. Includes pharmacists in Federal service.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table XII-A-3. Third-To-Last Year Enrollment in Schools of Pharmacy in the United States, by Sex: Academic Years 1969-70 Through 1987-88[1]

Academic year	Both sexes	Male	Female
	Number of students		
1969-70	5,428	4,248	1,180
1970-71	5,694	4,345	1,349
1971-72	6,532	4,849	1,683
1972-73	7,546	5,453	2,094
1973-74	8,342	5,834	2,508
1974-75	8,734	5,910	2,824
1975-76	8,710	5,601	3,109
1976-77	8,208	4,969	3,239
1977-78	8,461	5,035	3,426
1978-79	8,321	4,694	3,627
1979-80	8,035	4,398	3,637
1980-81	7,551	3,896	3,655
1981-82	6,899	3,441	3,458
1982-83	6,574	3,078	3,496
1983-84	6,715	3,097	3,618
1984-85	6,849	3,056	3,793
1985-86	7,084	2,990	4,094
1986-87	7,669	3,169	4,500
1987-88	7,867	3,212	4,655
	Percent		
1969-70	100.0	78.3	21.7
1970-71	100.0	76.3	23.7
1971-72	100.0	74.2	25.8
1972-73	100.0	72.3	27.7
1973-74	100.0	69.9	30.1
1974-75	100.0	67.7	32.3
1975-76	100.0	64.3	35.7
1976-77	100.0	60.5	39.5
1977-78	100.0	59.5	40.5
1978-79	100.0	56.4	43.6
1979-80	100.0	54.7	45.3
1980-81	100.0	51.6	48.4
1981-82	100.0	49.9	50.1
1982-83	100.0	46.8	53.2
1983-84	100.0	46.1	53.9
1984-85	100.0	44.6	55.4
1985-86	100.0	42.2	57.8
1986-87	100.0	41.3	58.7
1987-88	100.0	40.8	59.2

1/ These students comprise those in the first-year of the three years of professional pharmacy education, excluding any students in pre-pharmacy years.

SOURCE: American Association of Colleges of Pharmacy. Enrollment Report in Schools and Colleges of Pharmacy, 1987-88. Also prior reports.

Chapter XIII

PODIATRIC MEDICINE

Introduction

Podiatric medicine plays a significant role in health care by providing the diagnosis, treatment, and prevention of abnormal conditions of the foot. Podiatrists perform surgical procedures, prescribe drugs and corrective devices, and administer drugs and physical therapy. They are trained and licensed to deliver a wide range of services, including medical and surgical treatment of diseases of the skin and nails, and injuries affecting bones, tendons, muscles, and joints. They often serve as the entry point into the health care system for patients with systemic diseases that manifest themselves with symptoms in the feet.

Number and Characteristics of Podiatrists

In 1921 there were approximately 3,784 podiatrists in the United States; by the mid-1940s the profession had 7,000 practitioners. The number of podiatrists increased slowly up to the 1970s when Federal incentive programs such as capitation grants served as a stimulus for expanded enrollments in Colleges of Podiatric Medicine. The impact of the mid-1970s enrollment expansion was seen in the early 1980s as the number of graduates increased significantly. Total number of practicing podiatrists is estimated to be 11,517 in 1988, up from 11,000 in 1986 and 9,700 in 1983 (table XIII-1).

As more podiatric medical graduates have entered practice, podiatrists' median age has rapidly decreased from 51 in 1974 to 39.5 in 1983. The podiatric workforce is expected to remain relatively young for the rest of this decade, with a median age of 39 to 40. Data for number of years podiatrists have been in active practice also reflect this trend. The percentage of podiatrists in practice less than 10 years increased from 21.6 in 1974 to 46.3 in 1983 (APMA, 1985; DHHS, 1988).

Distribution of Podiatrists

Table XIII-1

Estimated Number of Podiatrists in the United States in 1970, 1975, 1983, 1986 and 1988

Year	Number of Active Podiatrists	Number per 100,000 Population
1970	7,100	3.5
1975	7,300	3.4
1983	9,700	4.2
1986	11,000	4.5
1988	11,517*	4.7

*Estimated

SOURCES: Number of active podiatrists, 1970 and 1975; Trends in the Podiatric Profession. Hyattsville, MD: DHEW, 1978

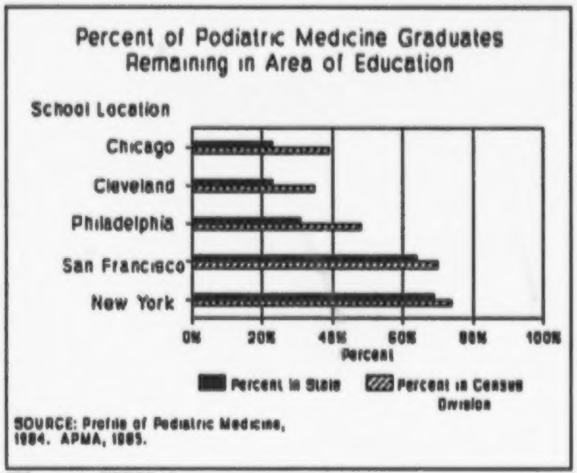
Number of active podiatrists, 1983; Profile of Podiatric Medicine - 1984, Washington, DC: APMA, 1985.

Substantial differences in the national distribution of podiatrists continue to exist. Although the total number of podiatrists increased from 7,120 to 9,700 between 1974 and 1983, their geographic distribution has not changed significantly. Graduates tend to locate in the general area of the college where they received their professional training. Approximately two-thirds of podiatric medical graduates of New York and California colleges remained in those States to practice; approximately one-fourth of the graduates of colleges in Illinois, Ohio, and Pennsylvania remained in the State where they received their professional training (APMA, 1985; DHHS, 1988). As more podiatrists complete residency training in States other than those in which the colleges are located, distribution patterns may change. Southern States continue to have the fewest podiatrists.

Podiatrists, like other specialized medical practitioners, must practice in areas that have enough population to generate an adequate number of patients. The majority of podiatrists (45 percent) locate in metropolitan areas of 10,000 population or more, (figure XIII-1) but few practice in inner cities. Less than 5 percent are found in communities of fewer than 10,000 and many rural residents lack podiatric care, although general and family physicians do provide some podiatric services.

Characteristics of Podiatric Practices

Podiatrists have traditionally been self-employed, usually in solo practice. There is a gradual trend away from solo practice, as younger podiatrists more frequently elect other practice arrangements. In 1983, 70.7 percent of podiatrists were in solo practice, 12.7 percent, in partnerships and 5.4 percent, in group practice. The remaining 10.2 percent were in practice in a variety of institutional settings.



SOURCE: Profile of Podiatric Medicine, 1984. APMA, 1985.

Figure XIII-1

Podiatric patients as a group tend to be female and older, partly because corns and callouses are more prevalent among these two groups. Corns and callouses are the ailments most frequently treated by podiatrists. Sixty-three percent of podiatrists reported that more than 25 percent of visits related to these problems. The second most frequently encountered diagnosis is onychomycosis and other nail diseases. Podiatrists also treat ankle and foot injuries, clubfoot, and other deformities, but patients with these problems more frequently go to orthopedic surgeons. Mortenson reported in 1985 that podiatrists treat about 59 percent of patients who seek help for bunion conditions, 75 percent of patients with corns and callouses, and 54 percent of ingrown nail conditions, but only 5 percent of foot fractures (Mortensen, 1985).

A survey sponsored by the American Podiatric Medical Association conducted in November 1983 provided the first national data on how podiatrists are reimbursed. Respondents reported the proportion of their practice income that comes from Medicare, Medicaid, and non-Government third-party payers by marking the most appropriate range for each (APMA, 1985). Although exact figures cannot be determined, it appears that about half of podiatrists' practice income comes from self-pay, 30 percent from non-Government third-party payers, 15 percent from Medicare, and less than 5 percent from Medicaid. The data show that, although individual reimbursement varies widely, reimbursement was higher for podiatrists who have been active less than 10 years. Other podiatrists grouped by age showed little fluctuation in reimbursement experience. These findings may indicate that younger podiatrists make greater use of third party payments and provide more extensive services including surgery.

Developments in the Licensure of Podiatrists

Every podiatrist is required to be licensed by the State(s) in which he or she practices. Each State establishes its own requirements for licensure and limits of practice. Practice limits vary, but usually include: anatomical areas where surgery can be performed; parts of the foot that may be amputated; and rules on the uses of anesthesia and prescription drugs. In recent years, States have increased licensure requirements by requiring podiatrists to complete one year of residency training prior to licensure. According to the Federation of Podiatric Medica Boards, the following States had such a requirement as of June 1989: Alaska, Arizona, California, Georgia, Hawaii, Idaho, Michigan, Mississippi, New Jersey, Oklaloma, Oregon, Rhode Island, and Virginia.

Educational Developments

Colleges of chiropody were first established in the early 1900s. Courses of study offered were essentially one-year in length with a curriculum that was a combination of day and night courses. By 1924 night courses were eliminated and a two-year curriculum introduced. By 1932 three-year programs were the rule, and by 1948, four-year programs were required.

Today, podiatric training typically requires four years of college preparation and four years of specialized training at a College of Podiatric Medicine. During the first two years of professional training the student receives a thorough grounding in basic sciences. The following two years of clinical training focus on diagnosis, treatment and prevention of abnormalities of the foot, and on systemic diseases that have manifestations in the feet. Residency training usually lasts one year, although a number of two- and three-year surgery residency programs are available. Completion of residency training generally provides greater access to hospital privileges, increases referrals from physicians, and usually leads to higher practice incomes.

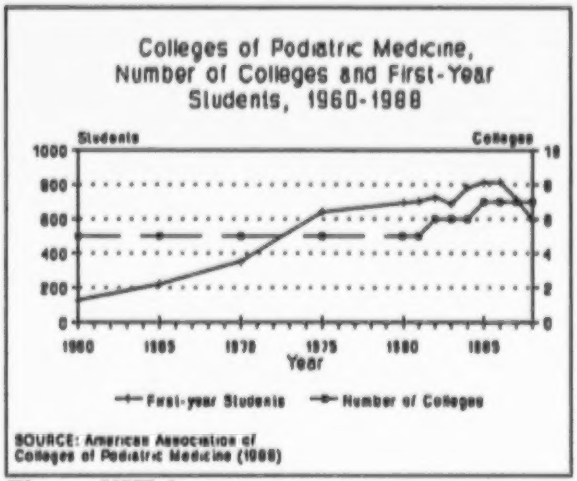
The podiatric profession initially consisted of generalists, with all podiatrists performing a full range of podiatric care. The podiatric profession, like other health professions, gradually has become more specialized. Three specialty boards in the podiatric medical profession have been established: American Board of Podiatric Surgery, American Board of Podiatric Orthopedics, and American Board of Podiatric Public Health. In 1988 the number of podiatrists achieving diplomate status in each specialty was as follows: 1,981 in Podiatric Surgery, 476 in Podiatric Orthopedics, and 36 in Public Health.

The profession is currently considering the establishment of a specialty in primary care. In November 1988 the Health Professions Reauthorization Act (PL 100-603) amended Title VII of the Public Health Service Act to authorize support of primary care residency training in podiatric medicine. This new grant program was initiated by the Bureau of Health Professions, HRSA in June 1989. The $585,000 available for fiscal year 1989 supports approximately 8 to 12 residency training programs to train 24 to 36 residents in the field of podiatric primary care.

Undergraduate Students

Podiatric professional training is provided by seven private colleges, five of which are free-standing colleges of podiatric medicine. The two most recently established colleges, College of Podiatric Medicine and Surgery, Des Moines, Iowa,(1982), and Barry University School of Podiatric Medicine, Miami Shores, Florida,(1985), are in university settings. First-year student enrollment and total student enrollment in academic years 1986-87, 1987-88, and 1988-89, by college, is presented in appendix table XIII-A-1.

Enrollment in colleges of podiatric medicine expanded rapidly from 1960 through 1975 (figure XIII-2); first-year enrollments increased from 127 students in 1960 to 641 students in 1975 (figure XIII-2). From 1975 through 1981, first-year enrollments gradually increased to 702 students. Enrollment increases in 1982 and again in 1985 reflect the addition of the two new colleges more than continued expansion of existing colleges that already were operating at or near capacity.


Colleges of Podiatric Medicine, Number of Colleges and First-Year Students, 1960-1988

SOURCE: American Association of Colleges of Podiatric Medicine (1988)

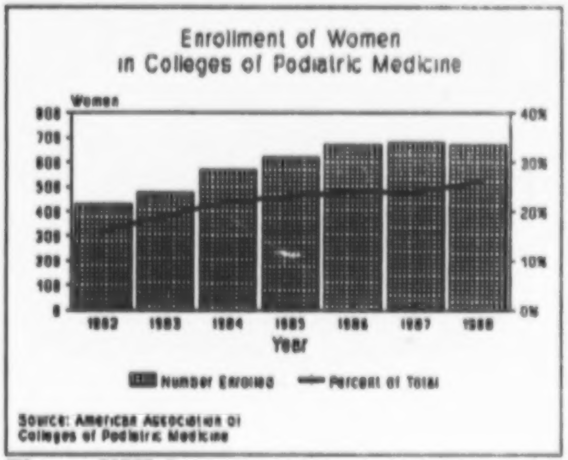
Figure XIII-2

In recent years the size of the applicant pool has decreased while the applicant per admission ratio has remained stable. In 1986-87 there were 815 first-year students selected from a total of 958 applicants--a ratio of 1.2 applicants per admission, a slight decrease from the 1.3 to 1 ratio of 1985-86 and the early 1980s. In 1988-89 the ratio of applicants per admission was again 1.3 to 1, with 595 first-year students selected from 751 applicants. Continued reductions in size of the applicant pool in the future may force some colleges to reduce admissions to maintain academic standards.

The number and percentage of minority and female students enrolled has increased significantly over the years (figures XIII-3 and XIII-4). In 1974-75 minority students made up only about 5 percent of total student enrollment, or 96 of 1,623 students. Fourteen years later the proportion of minority students had risen to 19.4 percent, or 506 of 2,608 students. The proportion of female students grew at an even faster rate; in 1974-75 female students made up 3 percent of the total enrollment, or 49 of 1,623 students, compared in 1988-89 to 25.7 percent of total enrollment, or 671 of 2,608 students. From academic year 1982-83 to academic year 1988-89 the number and percentage of minority students enrolled nearly doubled, and the number and percentage of female students enrolled increased by more than 55 percent.

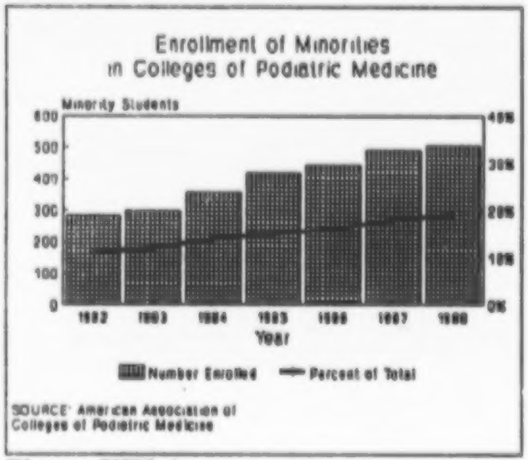
From academic year 1986-87 through academic year 1988-89 first-year attrition rates declined, but four-year attrition rates remained relatively stable. First-year attrition rates declined from 11 percent in 1987 to 9 percent in 1988 and 7 percent in 1989. Four-year attrition rates were 15 percent in 1987, 17 percent in 1988, and 16 percent in 1989.

More than 60 percent of first-year students in the seven colleges of podiatric medicine (in academic year 1987-88) are from States in which podiatric colleges are located . Because the colleges, in general, do not offer reduced tuition for in-State students, geographic proximity rather than cost appears to be the major factor influencing school selection.



Source: American Association of Colleges of Podiatric Medicine

Figure XIII-3



SOURCE: American Association of Colleges of Podiatric Medicine

Figure XIII-4

The Colleges of Podiatric Medicine

The basic mission of colleges of podiatric medicine is to provide professional training. The colleges are involved in a wide range of other activities as well: sponsoring residency training; conducting research; providing continuing education for practicing podiatrists; preventive services to the community; and foot care for individuals.

The colleges maintain a relatively small number of basic science faculty that provides most of the teaching during the first two years of the curriculum. Clinical faculty are primarily Doctors of Podiatric Medicine (D.P.M.s) who teach and demonstrate clinical skills to third- and fourth-year students and, in some programs, first-year residents.

Table XIII-2

Faculty in Colleges of Podiatric Medicine,
Academic Years 1986-87, 1987-88, 1988-89

Highest Degree Held	Number of Faculty					
	Full-Time			Part-Time		
	1986-87	1987-88	1988-89	1986-87	1987-88	1988-89
D.P.M.	117	134	127	175	200	154
Ph.D.	75	75	64	28	43	19
M.D./D.O.	46	45	45	86	113	85
Others	30	29	29	40	35	38
Total	268	283	271	329	391	296

SOURCE: American Association of Colleges of Podiatric Medicine (1988).

There has been little change in the number of full-time faculty (table XIII-2); 268 full-time faculty are employed in academic year 1986-87 compared to 271 employed in 1988-89. However, the number of part-time faculty employed by the colleges has varied noticeably, increasing from 329 in 1986-87 to 391 in 1987-88 and then decreasing to 296 in 1988-89.

Although each colleges' facilities and curricula differ, the training of third-year students typically is concentrated in local clinics operated by the college. Fourth-year training occurs in local clinics and also in remote locations, for example, such as internships in hospitals or clerkships in offices or clinics. In 1986 clinical training in off-campus settings was provided to 1,137 students.

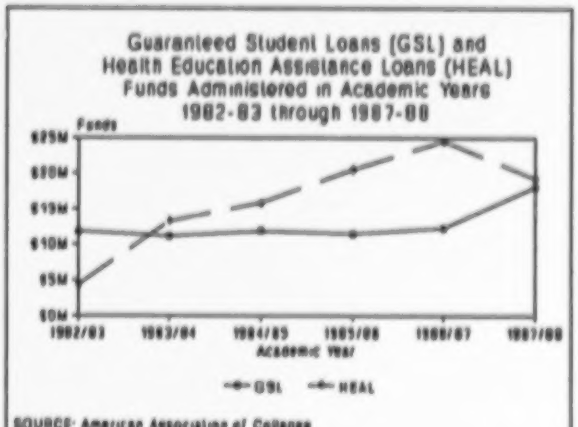
Curriculum

In 1984 the American Podiatric Medical Association (APMA), in conjunction with the American Association of Colleges of Podiatric Medicine (AACPM) and the Council on Podiatric Medical Education (CPME), authorized a commission of distinguished health care individuals outside podiatric medicine to identify issues and develop strategies to meet challenges that will face the podiatric profession in the year 2000. The resulting report, Project 2000, proposed nineteen major recommendations focused on: scope of practice of podiatric medicine, including the role of the podiatric physician in the health care system; relationship between podiatric and other physicians; relationship between colleges of podiatric medicine and academic health centers; and podiatric medical education, both pre-doctoral and post-doctoral. A ten-member commission has been appointed to study the recommendations and report the findings at the annual meeting of APMA in 1989.

Educational Expense and Financial Aid

The range of tuition and fees at the private, non-profit colleges of podiatric medicine has increased from $10,800 - $13,200 for academic year 1986-87 to $12,600 - $14,700 for academic year 1988-89, an average annual increase of 6.9 percent. Over the years, increases in tuition costs and living costs have resulted in a significant increase in amount of student aid administered by the colleges and in average amount of aid provided to each student. Total aid administered by the colleges increased from $21.8 million in 1982-83 to $47.6 million in 1987-88, up 119 percent. From 1986-87 to 1987-88 total aid administered rose from $44.1 million to $47.6 million, up 7.9 percent. Average aid provided annually by the colleges to each student increased from $8,900 in 1982-83 to $19,399 in 1987-88, up 118 percent. From 1986-87 to 1987-88 average aid increased from $16,910 to $19,399, up nearly 15 percent (table XIII-A-2.)

The two major sources of financial assistance are the Guaranteed Student Loan (GSL) Program and the Health Education Assistance Loan (HEAL) Program. Beginning in 1982 use of the HEAL Program increased dramatically as other sources diminished or became inadequate to meet the needs of students (figure XIII-5). Aid provided through the HEAL Program increased from $4.3 million in 1982-83 to $24.4 million in 1986-87 and then decreased by approximately 22 percent ($5.2 million) to $19.2 million in 1987-88. Reliance on GSL funds remained relatively stable from 1982-83 to 1986-87, ranging from $11.7 million to $12.2 million. A substantial increase in reliance on GSL funds occurred in 1987-88 when $18.0 million was loaned, an increase of approximately 48 percent ($5.8 million).



SOURCE: American Association of Colleges of Podiatric Medicine (1988)

Figure XIII-5

The typical graduate in 1988 had an estimated debt of $60,000 for four years of professional training. This substantial debt probably influences choice of location of practice. Shortage areas where podiatric medicine has not been highly visible, such as the South, are not attractive un[illegible] these economic conditions.

New Loan Program to Assist Podiatric Medicine Students

Recognizing the continuing and increasing need for loan assistance the American Association of Colleges of Podiatric Medicine (AACPM) and the Pennsylvania Higher Education Assistance Agency (PHEAA) created a loan program designed to meet the needs of all podiatric medical students. The new program, initiated in 1989, is called the Assured Podiatric Education Assistance Loan (APEAL). It assures students access to three federally sponsored or guaranteed student loan programs: Stafford Loans (formerly Guaranteed Student Loans); Supplemental Loans to Students (SLS); and Health Education Assistance Loans (HEAL).

The AACPM anticipates that the terms and conditions of APEAL will reduce both borrowing costs and burden of repayment. The APEAL program is expected to make the field of podiatric medicine more attractive to potential applicants.

Residency Training

As of August 1988, 176 institutions in 34 states were recognized by the Council on Podiatric Medical Education as sponsors of approved podiatric residency programs. A total of 463 first-year positions were available in 209 ongoing podiatric residency programs (table XIII-3).

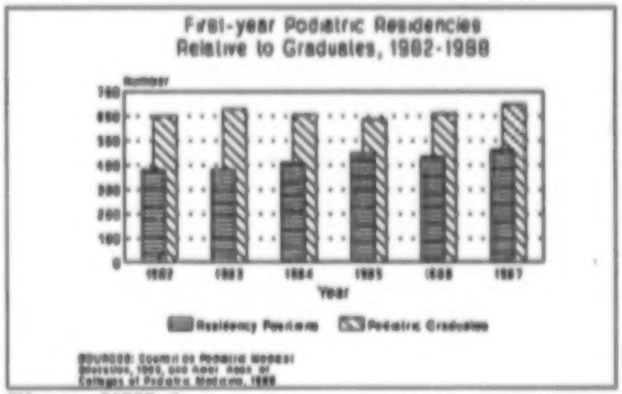
Table XIII-3

Podiatric Residencies
Program Category and Length of Training
Number of Programs and First-Year Residency Positions in 1988

Program Category	Length of Training	# of Programs	Positions
Rotating Podiatric Residency	12 months	43	130
Podiatric Orthopedic Residency	12 months	8	31
Podiatric Surgical Residency	12 months	101	209
Podiatric Surgical Residency	24 months or more	57	93
Total		209	463

SOURCE: Council on Podiatric Medical Education (1988)

In 1987-88 over 90 percent of graduates applied for a residency position, but only 70 percent were able to obtain a first-year residency position (figure XIII-6). Even though the number of approved first-year residency positions has grown significantly, from 382 in 1982-83 to 463 in 1987-88, the increase in postgraduate positions is not sufficient to meet demand. As podiatric medicine has grown, residency education and training is no longer seen as a luxury sought by only a few as they complete the doctoral program.



SOURCES: Council on Podiatric Medical Education, 1988, and Amer. Assn. of Colleges of Podiatric Medicine, 1988

Figure XIII-6

The shortage of residency training positions may be impacting negatively on the profession in the following ways: (1) Podiatrists enter practice with different levels of preparation; (2) a substantial amount of student time and energy during the fourth year is expended to obtain acceptance by a residency program; and (3) applicants may not pursue a podiatric medicine education if there is an insufficient number of residency training positions available.

The profession is actively promoting an increase in number of residency positions available annually by encouraging development of new residency programs in the field of primary care. It is anticipated that Federal grants authorized by the Health Professions Reauthorization Act of 1988 (P.L. 100-67) to support primary care residency training will alleviate the position shortage by establishing new first-year residency positions.

Graduates

The number of graduates is not likely to change dramatically. The total number of students enrolled in colleges of podiatric medicine increased from 1,268 students in 1971-72 to 2,608 students in 1982-83. Total student enrollment reached a peak of 2,832 students in 1986-87, largely the result of the opening of two new colleges, one in Iowa in 1982 and the other in Florida in 1985. By 1987-88 total student enrollment returned to a level of 2,608 students.

The gender composition of the graduate population is changing (table XIII-4). The 1982-83 class of 631 graduates contained only 77 women, or 12 percent, whereas the 1987-88 graduating class of 647 graduates had 160 women, or 25 percent, a trend likely to continue as more women choose a career in podiatric medicine.

The graduate population will also begin to reflect the increase in minority student enrollment. The 1982-83 graduating class contained 63 minority students, or 10 percent, compared to 93 minority students, or 14 percent, in the 1987-88 graduating class.

Table XIII-4

Number and Percentage of Women and Minorities
Graduated from Colleges of Podiatric Medicine
Academic Years 1982-83 through 1987-88

Academic Year	Graduates				
		Women		Minorities	
	Total	#	%	#	%
1982-83	631	77	12.2	63	10.0
1983-84	607	77	12.7	57	9.4
1984-85	582	116	20.0	64	11.0
1985-86	612	124	20.3	64	10.5
1986-87	590	123	20.9	66	11.2
1987-88	647	160	24.7	93	14.4

SOURCE: American Association of Colleges of Podiatric Medicine (1988).

Research Program Initiated by the Podiatric Profession

In 1988 the podiatric profession announced a Podiatric Medicine Research Grant Program, a joint effort funded by the American Podiatric Medical Association and administered by the American Association of Colleges of Podiatric Medicine. Approximately $300,000 was made available in the first grant cycle to aid researchers to examine biomedical, health services, and other projects related to podiatric medicine. Eligible applicants include individual independent investigators in podiatric medical predoctoral and postdoctoral programs (faculty, administrators, students, or trainees) or in podiatric medical practice. The research program and the individual projects are expected to contribute to the body of scientific knowledge and/or professional literature.

A Look into the Future

First-year student enrollment declined from 716 students in 1987-88 to 595 students in 1988-89. This decline is attributable, in part, to: relatively high tuition costs at colleges of podiatric medicine (all of which are private nonprofit institutions); increases in average debt load of students upon graduation; applicant awareness of an insufficient number of residency slots to accommodate graduates; and a lack of visibility of the profession in geographic areas where few podiatrists practice.

The profession has initiated programs to enhance student recruitment, increase first-year student enrollment, and expand the number of available residency positions. The new loan program, titled APEAL, will make loan funds more accessible. A new specialty in podiatric primary medicine appears to be evolving. The establishment of new residency programs, with assistance of a new Federal grant program in 1989, will increase the number of residency slots available. These increases, combined with smaller graduating classes, are expected to significantly reduce the shortfall in residency positions in the next two to four years.

It is anticipated that actions taken by the profession will positively impact on first-year student enrollment resulting in a stabilization at approximately 600 students by 1990 followed by a gradual increase to a first-year enrollment of 740 students by the mid-1990s.

The following projections of future supply (figure XIII-7) assume that first-year student enrollment will stablize in the early 1990s and that the current attrition rate of 16 percent will remain constant. Data on numbers and age distribution as of 1983 (APMA, 1985) were used to establish the base population for projections. The projected supply was reduced, each year, by a factor that represents expected deaths and retirements.

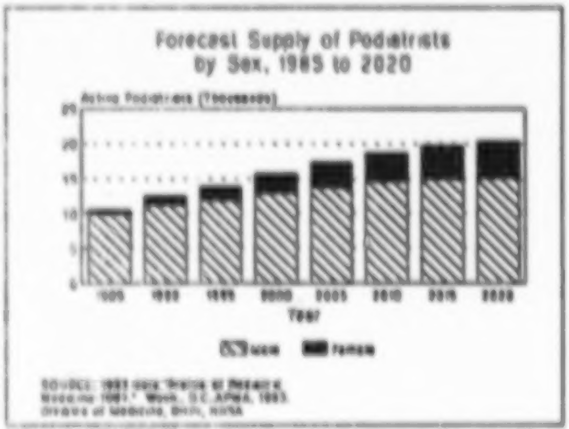


Figure XIII-7

Requirements

Several factors are likely to increase or maintain the demand for podiatric services: (l) The projected increase in the number of elderly Americans, and an expanded awareness of the role podiatrists can play in maintaining mobility; (2) the current emphasis on exercise as a key component of health promotion; (3) prevention and treatment of sports injuries; and (4) the level of reimbursement by third-party payers for services provided by podiatrists.

It is not possible to project requirements accurately for 1990 or later due to the absence of adequate utilization data. The Health Interview Survey to be conducted by the National Center for Health Statistics in 1990 includes a section on consumer utilization of podiatric services. The Bureau of Health Professions is supporting this data collection in response to a Congressional request for data on current utilization of podiatric services. Data from the survey should be useful in developing requirement projections in the future.

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Table XIII-A-1. Colleges of Podiatric Medicine, Number of Students in Academic Years 1986-87, 1987-88, 1988-89

	Number of Students					
	First-Year			Total Enrollment		
	1986-87	87-88	88-89	1986-87	87-88	88-89
California College of Podiatric Medicine	112	90	91	402	404	374
College of Podiatric Medicine and Surgery	73	78	62	258	279	264
Dr. Wm. M. Scholl College of Podiatric Medicine	165	140	88	555	548	487
New York College of Podiatric Medicine	137	130	121	528	524	486
Ohio College of Podiatric Medicine	152	109	80	537	477	422
Pennsylvania College of Podiatric Medicine	110	124	119	458	448	439
Barry University School of Podiatric Medicine	66	45	34	94	110	136
Total	815	716	595	2,832	2,790	2,608

SOURCE: Unpublished data; American Association of Colleges of Podiatric Medicine, Rockville, MD (1988)

Table XIII-A-2. College-Administered Student Assistance Data, Academic Years 1982-83 Through 1987-88

	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Number of Students Receiving Aid	2,445	2,331	2,443	2,495	2,610	2,455
Percent of Enrollment	94	89	93	91	92	88
Total Aid (in millions of $)	21.8	29.4	33.0	38.4	44.1	47.6
GSL (in millions of $)	11.7	11.0	11.8	11.4	12.2	18.0
HEAL (in millions of $)	4.3	13.2	15.7	20.4	24.4	19.2
Average Aid per Student ($)	8,900	12,600	13,500	15,392	16,910	19,399

SOURCE: American Association of Colleges of Podiatric Medicine (1988)

Chapter XIV

VETERINARY MEDICINE

Introduction

Veterinary medicine contributes to human health and quality of life through the care of animals. It protects people from health risks related to animals and animal products and plays an important role in medical and biological research.

Developments in Supply

Current Supply

The supply of active veterinarians in the United States grew by more than 50 percent between 1975 and 1988. In 1988 approximately 47,500 veterinarians were active, increasing from 31,100 in 1975. Although women constituted only 9,900 or 20.8 percent of all active veterinarians in 1988, the supply has grown in recent years and is expected to grow substantially in the future. Between 1977 and 1988 male veterinarians increased by 25 percent (from 30,100 to 37,600) while female veterinarians increased by nearly 250 percent (from 2,900 to 9,900). The growing number of female veterinarians reflects substantial growth in the enrollment of women in veterinary schools (figure XIV-1).

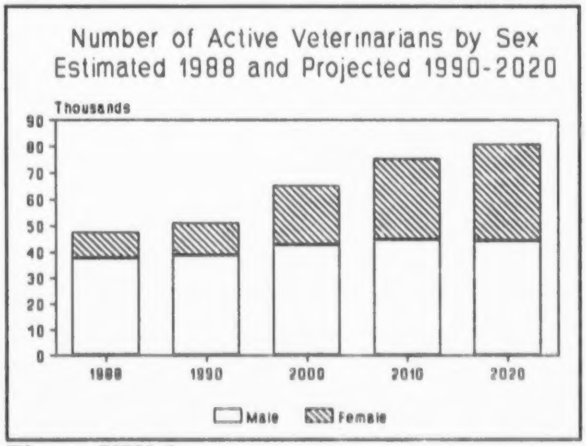

Figure XIV-1

Increased entry of women is also reflected in the age distribution because female veterinarians are generally younger. Median age of all active veterinarians in 1988 was 39.9 years. Three-fourths of all veterinarians were age 49 or younger, 18 percent were between age 50 and 64 and 7 percent were 65 or older. Median age for men was nearly 43 years, and more than 31 percent were over age 50. Female veterinarians had a median age of nearly 33 years, only 2 percent being over age 50.

Practice Characteristics

Veterinary medicine has 12 specialties with established educational requirements and competency certifying procedures. The Board-certified specialties include toxicology, laboratory animal medicine, theriogenology (animal reproduction), anesthesiology, dermatology, internal medicine (with subspecialties in cardiology and neurology), microbiology, ophthalmology, pathology, preventive medicine, radiology, and surgery.

According to the Master File of the American Veterinary Medical Association in 1988, the principal activities of 83 percent were in large, small, and mixed animal practices (including bovine, equine and porcine practices). Within these areas 43 percent were in small-animal practices, 31 percent, in mixed-animal practice, 9 percent, in large-animal practice and the remainder in a variety of other disciplines. These same activities also represented the largest proportion of active veterinarians in 1979 and 1984.

In 1988, 45 percent of all active veterinarians were self-employed, and about 33 percent worked in other private practices. Together, these two groups grew from 27,000 in 1979 to 37,200 in 1988, a 38 percent increase. Nearly all, 97 percent, in private practice had either large, small, or mixed animal practices.

Employment of veterinarians varies by sector of employment. Colleges, universities, and industrial settings showed increases in veterinarians employed between 1979 and 1988, while the number of veterinarians has decreased in Federal and State governments. In 1988 most veterinarians working for the Federal government were engaged in regulatory activities (60 percent), while 6 percent worked in public health. State and local government veterinarians worked principally in regulatory activities and public health (41 percent and 12 percent respectively). In 1988 nearly four of five active veterinarians were primarily engaged in clinical practice with the remainder in research, education, inspection, and management. Eighty-nine percent in clinical practice were self-employed or employed in other private practices. Among those engaged in research, 46 percent were employed by colleges and universities, 26 percent were in private industry, and most of the remainder were employed by the Federal government as civilians or members of the Armed Forces. Among veterinarians engaged in inspection activities, 69 percent were employed by the Federal government, 17 percent were employed by State and local governments, and 6 percent were in the Armed Forces, the remainder being distributed among other employers.

Student Trends and Developments

Applicants

The number of applicants to schools of veterinary medicine has decreased steadily since the beginning of the decade, from 7,286 in academic year 1980-81 to 4,200 in 1988-89, a 42 percent decrease (Tasker, 1988). Since the number of first-year positions in the schools has changed little, the proportion of applicants admitted has increased substantially during this period. In 1980-81 there were 3.3 applicants per first-year position with only 30 percent of the applicants enrolled; in 1988-89 the number of applicants per first-year position declined to 1.9 with 52 percent of the applicants enrolled. Of the 1988-89 applicants, 59.7 percent were women, and 7 percent belonged to minority groups including 2.8 percent Hispanic and 2.6 percent Black.

Enrollments and Graduates

Enrollments in schools of veterinary medicine have increased substantially over the past 23 years, with total enrollments up by 115 percent, from 4,119 in 1965-66 to 8,558 in 1988-89. However, in recent years there has been some decline in total enrollment. The enrollment level in 1988-89 was 2.2 percent less than the previous year.

In the decade between 1965-66 and 1975-76, first-year enrollments rose 38 percent, from 1,242 in 1965-66 to 1,712 in 1975-76. First-year enrollments reached 2,300 in 1984-85, a 34 percent increase over the previous decade and an 85 percent increase over the 1965-66 level. However, first-year positions have also declined in recent years to 2,195 in 1988, a decline of 4.6 percent over the level four years earlier.

The number of graduates has increased by 164 percent in two decades, from 815 in 1964-65 to 1,408 in 1974-75 and 2,169 in 1987-88. Much of the increase in enrollments during the past two decades can be attributed to Federal support, although State governments have also provided substantial support.

The number and proportion of women enrolled has increased substantially in recent years. In 1984-85 women became the majority of entering students, 55.4 percent. In 1985-86, there were 1,265 women enrolled as entering students, an increase of 163 percent over the number in 1975-76, and 8.6 percent over 1984-85. Women were 28 percent of first-year enrollees in 1975-76, which, in turn, reflected substantial increases in the proportion during the early 1970s. The proportion of women enrolled has, in fact, increased each year since academic year 1970-71. In the academic year 1988-89, 1,293 or 58.9 percent of entering students were women and 57.2 percent of total enrollment were women.

In 1988-89, 563 students, 6.6 percent of total enrollments were members of minority groups, a proportion that has been nearly constant in recent years. About 30 percent of minority students were enrolled in one school--Tuskgegee Institute. Black students accounted for 200 minority enrollments. Hispanic students accounted for 196 students.

Other Training in Schools of Veterinary Medicine

Of the students enrolled in 1988, 79 percent were undergraduates seeking veterinary degrees. Approximately 21 percent of students were seeking advanced degrees or certificates of advanced training. The largest group, one-fourth, as almost all comprised of students with veterinary degrees seeking a Ph.D. degree. Nearly 550 students had a Doctor of Veterinary Medicine degree, but were seeking an additional Ph.D. degree at a school of veterinary medicine as were 500 students without a veterinary medicine degree. Almost 300 veterinarians and over 400 non-veterinarians sought master's degrees. The remaining groups consisted of other graduate students seeking advanced degrees and veterinary graduates seeking certificates of internship and residency.

Costs of Veterinary Medicine and Indebtedness

The Association of American Veterinary Medical Colleges determined from its recent survey of member institutions that the average annual cost, including tuition in 1988, for a resident at a State-supported college was $4,200. Costs of education ranged from $1,500 for a resident student at the University of California, Davis and North Carolina State University to $8,500 for a resident student at the New York State College of Veterinary Medicine. Average annual cost for a non-resident was $10,700. Highest yearly cost exceeded $20,000 for a non-resident student at Colorado State University and Tufts University. Median level of educational debt reported was $19,700. There was a wide variation in the level of educational indebtedness as nearly 15 percent of the students had educational debts exceeding $40,000, although about 30 percent had educational debts under $10,000.

Faculty

Almost 2,800 academic and professional personnel (excluding interns and residents) were employed in schools of veterinary medicine in 1988-89. About 2,600 or 92 percent were in a tenure track (assistant professor or above). Somewhat more than 1,000 were categorized as full professors or were full professors functioning as administrators. About 30 percent were associate professors and the remainder, assistant professors.

Projections of Future Supply

Despite declining enrollments the supply of veterinarians is expected to rise in the coming years. Three sets of projections of the supply of active veterinarians between 1988 and the year 2020 are presented here. Each rests upon different assumptions regarding the number of new graduates during the projection period. Each set of projections assumes that the growth rate in the proportion of first-year enrollments of women observed in the most recent academic years will continue until 1990 and then remain constant at 59 percent. The same attrition and separation rates are utilized in all projection series.

Basic Series

Projections of enrollments and graduates of schools of veterinary medicine are critical to projections of overall supply. The basic (or most likely) supply projection series assumes that the decline in first-year enrollment at the 27 existing schools during the four most recent academic years will continue, but at a slower rate. It is therefore assumed that first year enrollments will decline at a level of 5 percent over a ten year period remaining constant thereafter. Among the reasons for this decline are a decrease in real income levels of veterinarians, increases in career alternatives, and declines in the pool of available students.

Based upon these assumptions first-year enrollments are projected to decrease from 2,195 in 1988 to 2,098 in 1997, then remain at that level through the end of the projection period. The total number of students graduated between 1988 and the year 2000 would be 25,700 or about 40 percent of the active supply in the year 2000. In the years between 2000 and 2020 an additional 41,300 veterinarians are projected to enter the active supply, comprising more than 50 percent of the active supply in the year 2020.

The basic series assumes a 5 percent decline in first year enrollment over a ten-year period resulting in an average annual increase in supply of 1,470 between 1988 and 2000. The average annual increase between 2000 and 2020 is 780, substantially less due to expected retirements in the early part of the next century. The supply of active veterinarians would increase from 47,500 in 1988 to 65,100 in the year 2000--a 37 percent increase and an annual growth rate of 3.1 percent (figure XIV-2). Growth rate over the two decades between 2000 and 2020 would be somewhat slower (1.2 percent annually), the active supply being projected to rise to 80,800 by the year 2020. The ratio of active veterinarians per 100,000 population is projected to rise from 19.2 in 1988 to 24.3 by the year 2000 and 27.4 by the year 2020.

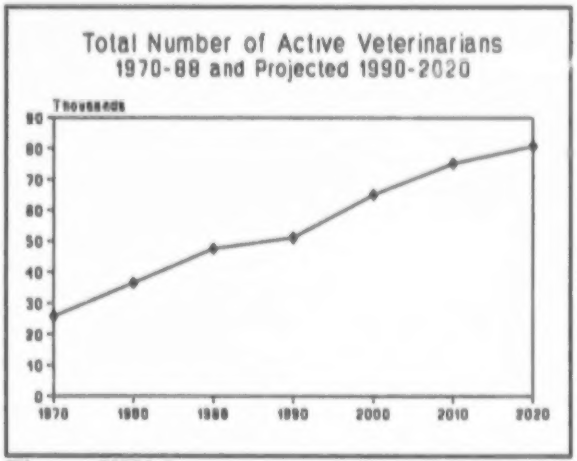

Figure XIV-2

Under this assumption the proportion of active female veterinarians would increase sharply, rising from 20.8 percent in 1988 to 34.1 percent by the end of the century and to 45.2 percent by the year 2020. The number of women in veterinary medicine is expected to more than double between 1988 and 2000, from 9,900 in 1988 to 22,200 by the century's end. This number is projected to increase by another 65 percent between the year 2000 and 2020, reaching 36,500 active veterinarians in that year.

Low Alternative Series

The low series of supply projections also assumes that veterinary medical schools will be unable to maintain enrollments at existing levels. This assumption is predicated upon reduced enrollments resulting from higher costs and increased competition from other occupations, thereby reducing the number of applicants. Thus, it is assumed that first-year enrollments will further decline 10 percent between 1988 and 1997 (slightly less than the annual decline in enrollment in recent years) and that no new schools will open during the projection period.

Under these assumptions the total number of new graduates between 1988 and 2000 would be 25,300 or about 2 percent less than the basic series. In the low series the number of active veterinarians would increase from 47,500 in 1988 to 64,700 in the year 2000 and to 78,200 in 2020 for a ratio of 26.6 per 100,000 population. The number of veterinarians in the year 2020 would be 2,600, 3.2 percent less than the basic series. The number of female veterinarians in that year would be 35,000, 45 percent of all active veterinarians.

High Alternative Series

A high alternative series assumes maintenance of 1988-89 first-year enrollment levels of 2,195 until the end of the projection period. This series is produced to provide a steady-state benchmark for purposes of contrast with the other two projection series. Graduates are projected to decrease from 2,292 in 1988 to 2,161 in 1992 after which they would remain constant. Based upon these assumptions a total of 26,100 are projected to graduate between 1988 and 2000, 2 percent more than in the basic series.

In the high alternative series the number of active veterinarians is projected to increase from 47,500 in 1988 to 65,500 by the end of the century and 82,800 by the year 2020. The ratio of active veterinarians per 100,000 population in the end of the projection period would be 28.1. The number of active veterinarians in the year 2020 would be 2,000, 2.5 percent more than the basic series. The number of female veterinarians projected in this series in the year 2020 would be 37,600 or 45 percent of the active supply.

Veterinary Medicine Future Directions

The profession of veterinary medicine is being molded by forces of change in society, by rapid advances in science and technology, and by the needs and expectations of the community being served. The profession itself, in order to obtain an adequate perspective and quantification of the forces that may influence the profession, recently commissioned a study on the future directions for veterinary medicine carried out by the Pew National Veterinary Education Program of Duke University. An advisory panel under the direction of William R. Pritchard provided input. Following are major conclusions of this study:

> *Important demographic changes that will profoundly affect the nature of companion animal practice and increase the demand for services for at least twenty years. The age group between 34 and 59 years, having the highest income, owning the most pets, and spending the most for veterinary care, is the most rapidly growing segment of the population. Numbers and kinds of pets are rapidly changing and the amount of money people are willing to spend for maintenance of the health of these pets also is increasingly significantly.*
>
> *Increasingly, veterinarians will limit their professional activities to a class of animals or species, and a larger number will provide discipline-oriented specialized services. Veterinary practitioners will serve as important sources of information on care, husbandry, and health of all kinds of animals as well as on the prevention and control of diseases. The structure of veterinary practice will be changed to better use new, but costly technology, to improve management, to increase efficiency of the animal health delivery system, and to improve overall quality of veterinary services.*

Significant changes will be required in the educational processes to prepare veterinarians for the future. The college level general education of prospective veterinarians must be strengthened. The focus of professional education must be redirected from the accumulation of information to the acquisition of skills on how to find and use information, on problem solving, and on behaviors and attitudes essential to succeed as a veterinarian . According to the Panel, there is also a need to increase the diversity of students admitted to veterinary colleges.

Veterinary medical colleges in the future will manage more of the animal health and disease related information intensive services of public agencies than they do today, thus expanding their service roles in State and region. Some colleges will develop referral teaching hospitals in metropolitan centers while others will develop food animal centers in areas of concentrated livestock production. The research functions of veterinary colleges will be greatly increased, and research projects will become more fundamental in nature with practicing veterinarians conducting more of the applied research.

The Panel also supports increased research on the biology, health, and diseases of most animal species. Research on animal diseases not only has contributed importantly to animal and human welfare, but also has been an important source of fundamental biological and medical knowledge. Research on veterinary problems frequently has unexpected relationships to human health and stimulates important advances in human medicine. The understanding of AIDS and its causative agent, for example, benefitted immensely from the large amount of information already known about animal retrovirus.

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Table XIV-A-1. NUMBER OF ACTIVE VETERINARIANS AND VETERINARIAN-TO-POPULATION RATIOS: SELECTED YEARS, ESTIMATED 1970-1988, AND PROJECTED 1990-2020 1/

Year	All active veterinarians 1/	Total population (thousands)	Active veterinarians per 100,000 total population 2/
1970	25,900	206,466	12.5
1980	36,500	228,976	15.9
1988	47,500	247,284	19.2
1990	51,000	250,410	20.4
Low	51,000	250,410	20.4
High	51,000	250,410	20.4
2000	65,100	268,266	24.3
Low	64,700	268,266	24.1
High	65,500	268,266	24.4
2010	75,200	282,575	26.6
Low	73,600	282,575	26.0
High	76,400	282,575	27.0
2020	80,800	294,364	27.4
Low	78,200	294,364	26.6
High	82,800	294,364	28.1

1/ The basic methodology was use for the projections shown for the years 1986 through 2020; alternative assumptions were us for the low and high projections. includes veterinarians in Federal services.

2/ Ratios are based on total population, including Armed Forces overseas, as of July 1 for 1990 and succeeding years.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

U.S. Bureau of the Census. Current Population Reports, Series P-25, Nos. 977 and 1018.

Table XIV-A-2. NUMBER AND PERCENT DISTRIBUTION OF ACTIVE VETERINARIANS, BY TYPE OF EMPLOYMENT, AND BY SEX: DECEMBER 31, 1988

Type of Employment	All active veterinarians		Male		Female	
	Number	Percent distribution	Number	Percent distribution	Number	Percent distribution
All active	47,500	100.0	37,600	100.0	9,900	100.0
Self-employed	21,500	45.3	19,400	51.6	2,100	21.2
Private practice employee	15,700	33.1	10,100	26.9	5,600	56.6
College or university	4,600	9.7	3,300	8.8	1,300	13.1
Industrial employee	1,200	2.5	1,100	2.9	100	1.0
Federal government (civilian)	1,600	3.4	1,400	3.7	200	2.0
Armed forces	700	1.5	600	1.6	100	1.0
State or local government	900	1.9	800	2.1	100	1.0
Other	500	1.1	100	0.3	400	4.0

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table XIV-A-3. NUMBER AND PERCENT DISTRIBUTION OF ACTIVE VETERINARIANS, BY PROFESSIONAL ACTIVITY, AND BY SEX: DECEMBER 31, 1988

Type of professional activity	All active veterinarians		Male		Female	
	Number	Percent distribution	Number	Percent distribution	Number	Percent distribution
All active	47,500	100.0	37,600	100.0	9,900	100.0
Large animal practice 1/	4,100	8.6	3,500	9.3	600	6.1
Small animal practice	20,600	43.4	15,100	40.2	5,500	55.6
Mixed animal predominately large	5,100	10.7	4,700	12.5	400	4.0
Mixed animal predominately small	5,600	11.8	4,500	12.0	1,100	11.1
Mixed animal 50-50 large & small	4,100	8.6	3,000	8.0	1,100	11.1
Veterinary public health	350	0.7	300	0.8	50	0.5
Regulatory veterinary medicine	1,300	2.7	1,200	3.2	100	1.0
Laboratory animal medicine	700	1.5	500	1.3	200	2.0
Industrial veterinary medicine	300	0.6	300	0.8	50	0.5
Military veterinary medicine	450	0.9	400	1.1	50	0.5
Microbiology	350	0.7	300	0.8	50	0.5
Pathology	1,300	2.7	1,100	2.9	200	2.0
Surgery	400	0.8	300	0.8	100	1.0
Teaching and research	450	0.9	300	0.8	150	1.5
Other veterinary medicine 2/	2,400	5.1	2,100	5.6	350	3.5

1/ Includes bovine, equine, and porcine practices.

2/ Includes, physiology, toxicology, wildlife and zoo practice, theriogenology,veterinary administration, and other practice types.

3/ Numbers less than 25.

Table XIV-A-4. NUMBER OF ACTIVE VETERINARIANS, BY SEX: ESTIMATED 1988, AND PROJECTED FOR SELECTED YEARS, 1990-2020 1/

Year	Number of active veterinarians	Male veterinarians	Female veterinarians	Percent female of all veterinarians
1988	47,500	37,600	9,900	20.8
1990	51,000	38,800	12,200	23.9
2000	65,100	42,900	22,200	34.1
2010	75,200	44,800	30,400	40.4
2020	80,800	44,300	36,500	45.2

1/ The basic methodology was used for all of these projections. Includes veterinarians in Federal service; excludes veterinarians in U.S. Possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Divsion of Associated and Dental Health Professions.

Chapter XV

Chiropractic

Introduction

Chiropractic is a system of mechanical therapeutics consisting primarily of the adjustment or manipulation of the spinal column. Some chiropractors also use physiotherapy, nutritional supplementation, and other therapeutic modalities. Chiropractic, founded in 1895 by D.D. Palmer, had grown to 39,000 practitioners by 1988, trained in one of 17 schools.

The practice of chiropractic is defined by laws of individual States, which vary considerably in specificity and scope of practice. All States, the District of Columbia, and Puerto Rico require licensure and have established boards of chiropractic examiners, or the equivalent, to regulate the profession. Licensure requirements are periodically summarized and reported by the Federation of Chiropractic Licensing Boards (FCLB). Variation among States is clearly shown by several examples.

The very terse Vermont scope of practice (1987) is described thus by the FCLB: "The practice of chiropractic consists of diagnosing and treating human ailments without the use of prescription drugs or surgery." By way of contrast, the FCLB describes the 1987 Ohio scope of practice in the following way:

> *"The Doctor of Chiropractic is to be considered a primary care physician or primary health care provider. The practice of chiropractic is the utilization of the relationship between the musculoskeletal structures of the body, the spinal column and the nervous system, in the restoration and maintenance of health, in connection with which patient care is conducted with due regard for first aid, hygienic, nutritional, and rehabilitative procedures and the specific vertebral adjustment and manipulation of the articulations and adjacent tissues of the body. The chiropractor is entitled to use the title "Doctor" or "Doctor of Chiropractic" and is a "Physician" for the purpose of the State Welfare and Bureau of Worker's Compensation programs. The use of X-ray for diagnostic purposes is permitted. The use of acceptable clinical and laboratory*

> *diagnostic procedures is permitted. The use of first aid, hygienic, nutritional and rehabilitative procedures is permitted. The spinal adjustment and manipulation of the articulations and adjacent tissues of the body, including the extremities, is permitted. The practice of chiropractic does not permit the prescribing or administering of drugs for treatment. The Doctor of Chiropractic is authorized to examine, diagnose, and assume responsibility for the care of patients."*

Formulations of acts in other States vary within the broad range of Vermont and Ohio. Based on information published by the FCLB in 1987 (FCLB 1987):

- o *All States except Alaska, Colorado, Illinois, Louisiana, New York, and South Dakota require chiropractors to report diagnosed cases of communicable disease to a State agency.*

- o *In one-half the States, schools accept without restriction a chiropractor's report of physical examination of school children, while another eight do so with certain reservations.*

- o *Chiropractors are authorized to stipulate the cause(s) of death and sign death certificates in 21 States: Arkansas, California, Idaho, Illinois, Iowa, Kansas, Kentucky, Minnesota, Missouri, Montana, Nebraska, New Hampshire, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Vermont, Washington, West Virginia, and Wyoming.*

- o *Chiropractors have equal standing for payment with all other eligible health care providers in any health insurance sold to the public, except in the District of Columbia, Hawaii, Idaho, Illinois, Iowa, Nebraska, New York, North Dakota, Oregon, Puerto Rico, Vermont, and Wisconsin.*

In addition, statutes may be interpreted liberally or strictly within a State. As a result, a legitimate chiropractic treatment in one State may very well be prohibited by law in an another. No guidelines for or essentials of a model practice act are commonly accepted among the States today.

However, some commonality with respect to required preparation and knowledge base of chiropractors is realized through recognition by States of the national examination in chiropractic administered by the National Board of Chiropractic Examiners (NBCE). The NBCE, incorporated in 1963, is a non-profit organization that develops and administers standardized national examinations to test the proficiency and clinical competence of chiropractors. It administered its first national examination in the spring of 1965. In prior years many State chiropractic licensing boards tested applicants by using the basic science examinations designed for medical students.

The NBCE examinations are accepted in whole or in part by all 50 States and the District of Columbia. A Certificate of Attainment, awarded by the NBCE to those successfully sitting for these examinations, may fully satisfy a State's requirements for testing in the basic or clinical sciences. All States, however, reserve the right to further test candidates in these areas. As of 1986, the only States not recognizing the certificates are Maryland, Puerto Rico, and Texas.

All States except Alabama require a separate and additional examination in clinical competency. This may include some combination of written questions, personal interview and hands-on demonstration of practical skills and chiropractic techniques. The national written clinical competency examination introduced by the NBCE in 1987 may be recognized and accepted by many States in coming years. It is probable, however, that practical clinical skills demonstrations will continue to be required in most States for some time.

Any discussion of chiropractic must recognize that in both training and practice there are two distinct approaches to patient care. The 1980 Departmental report to Congress Chiropractic Health Care stated that "During the recent history of the profession, philosophical differences on the appropriateness of certain services offered by chiropractors have developed (DHHS, 1980). These differences are illustrated in two approaches to practice: (1) those whose care is confined almost exclusively to adjustments of spinal vertebrae, and (2) those where additional forms of treatment, i.e., ultrasonics, diathermy, ultra violet (heat and light), acupuncture, etc., may be prescribed for a large number of functional disorders related to all musculo-skeletal problems."

The first and most conservative approach has become known as "straight" chiropractic. There are three principal associations of Doctors of Chiropractic that are distinguished by the scope of practice which they espouse.

1. *The Federation of Straight Chiropractic Organizations. The association for straight chiropractors and the most philosophically conservative.*

2. *The American Chiropractic Association. The association for chiropractors holding the broadest and most liberal interpretation of their field.*

3. *The International Chiropractors Association. Self-described as conservative in view-point, this association probably represents the moderate middle of chiropractic philosophy of care.*

Total current membership of the three associations amounts to about one-half of licensed chiropractors in the country. Since some unknown percentage belong to more than group, they probably represent somewhat less than 50 percent of chiropractors in active practice.

Although the historic basis of chiropractic is manipulation of the spine, a large number of chiropractors today are opposed to many of the limitations on their scope of practice. As perceptions among chiropractors of the scope of chiropractic treatment and of the health conditions amenable to chiropractic treatment have evolved over the years, differences in theory among chiropractors and diversity among State practice acts have widened. Central to this dichotomy is the issue of diagnosis and referral. Doctors of Chiropractic who identify themselves as "straight" chiropractors believe that the field does not encompass diagnosis of medical diseases or conditions or referral for their treatment, since Doctors of Chiropractic do not hold degrees in medicine. They consider that responsibility for health lies with the individual patient and that chiropractors, as primary health care providers, contribute to an individual's health status only through the correction of spinal subluxations. They believe that when they improve a patient's health through chiropractic adjustment, the body's inherent ability to heal itself can then more readily act against any unhealthful condition that is present.

Chiropractors using a wider variety of treatments typically do not use any modifier when referring to themselves, but historically, straight chiropractors have frequently used the term "mixers" to describe them, suggesting that they are combining or mixing chiropractic with other treatment philosophies or methods. The terms "mixers" and "mixed chiropractic" are used less often today.

Regardless of the formal or informal philosophical positions of these associations and of individual chiropractors, the pragmatic view is that chiropractic is defined by a State's licensure laws and regulations; thus the practice of chiropractic is what the State says a chiropractor can or cannot do (DHHS, 1989). With wide variation among State laws, there is also variation in the scope of practice of Doctors of Chiropractic. Because of this, discussions of chiropractic characteristics, requirements, and services cannot be precise. In addition, data about chiropractic is very scarce.

Chiropractic Education

There were 17 U.S. schools of chiropractic in 1988. Three held accreditation from the Straight Chiropractic Academic Standards Association (SCASA), and 14 were accredited by the Council on Chiropractic Education (CCE). Table XV-A-1 shows each school, its location, accrediting body and number of graduates in 1981 and 1988. In all, approximately 10,000 students were enrolled in chiropractic education in 1988, of whom 2,500 were women. In its 1988 Report the CCE stated that the average incoming student held a college grade point average of 2.8-2.9 and that two of every five new students held a baccalaureate, master's, or doctoral degree in some other area of study.

The 1988 CCE Report stated that of 948 full and part-time faculty members, about 812 held the first professional, doctoral or similar degree, and represented about 723 full-time equivalent faculty positions (CCE, 1988).

Supply of Chiropractors

The number of chiropractors in active practice during 1988 is estimated to be 39,000, although figures range from 28,000 to 43,000. For straight chiropractors, the range of estimates is 5,000 to 10,000, the most likely total being about 7,000. Overall, the estimate of 39,000 provides a ratio of 15.8 active chiropractors per 100,000 population in 1988, compared with a ratio of 12.7 in 1985 and 9.6 in 1978 (table XV-A-2).

Characteristics of Chiropractors

In the 1980 report to Congress, "Chiropractic Health Care," results of a survey of a national sample of chiropractors were reported (DHHS 1980). Information from 1,638 respondents showed that 96.4 percent were male, 88.3 percent were active, and 28.6 percent were practicing in a large city (over 100,000 population) or its suburbs. On average, respondents had been in practice 19 years. The mean number of patient visits was 127 during a 44-hour work week.

More recent information has been collected by the American Chiropractic Association (ACA) in surveys of its membership, the last in 1988 (ACA, 1988). Since ACA membership is not assumed to be representative of all chiropractors, and since response rates have been low (about 350 responses to the 1988 survey) only tentative impressions of the chiropractic work force can be drawn from these surveys. They are useful, however, as the only indicators of trends in chiropractors and practice in recent years.

The median age of active chiropractors responding to the 1988 ACA Survey was 37.4 years, consistent with earlier ACA survey findings, and, despite small fluctuations, this age seems to be holding steady. Median age at time of graduation was 27.5 years.

Seventeen and one-half percent of responding ACA practitioners in 1988 graduated from the Palmer College of Chiropractic in Iowa. Since the first national ACA chiropractic survey in 1962, Palmer College graduates have constituted the largest single group among respondents. The next largest proportions of respondents on the 1988 survey were graduates of the National College of Chiropractic in Illinois (15.6 percent), the Logan College of Chiropractic in Missouri (11.2 percent), and the New York College of Chiropractic (8.4 percent). Although the percentage of respondents who are graduates of these schools has fluctuated slightly each year, the four schools have maintained their relative rank order throughout the 1980s.

The majority (54 percent) of 1988 ACA respondents held a license to practice in only one State. An additional 30 percent were licensed in two States, while the remaining 16 percent had active licenses in three or more States.

Despite the generally held view that chiropractors are most often located in rural settings and small communities, this has not been found to be true since the mid-1970s. In the last decade there has been a steady move toward urban practice. In the 1975 ACA survey about 43 percent of active chiropractors were found in communities of more than 50,000 people; since that time the percentage has slowly increased, with the 1988 survey showing that 56.5 percent of respondents were practicing in such communities, while 24.6 percent were located in areas with more than 250,000 residents (ACA, 1988). Only about 2 percent of respondents in 1988 were in communities with fewer than 2,500 inhabitants. For communities of 25,000 persons or fewer the percentage of practicing chiropractors has decreased from 45.1 percent in 1962 to 39.6 percent in 1975 and to 27.5 percent in 1988, with the result that there are about two-thirds as many chiropractors there today as in 1962.

The majority (87.3 percent) of ACA members responding in 1988 classified themselves as full-time practitioners, with another 6 percent in part-time practice. Retired chiropractors constituted 4.1 percent of respondents; only 0.8 percent were unemployed. These percentages have shown little fluctuation since 1980, with no consistent pattern of change. In 1988 the respondents reported that they worked an average of about 42 hours each week and 50 weeks annually.

The American Black Chiropractors Association (ABCA) estimates that there were no more than 500 Black chiropractors in active practice in 1988, not more than 50 of whom were women. Compared to the number of Blacks in the U.S. population, Blacks are very underrepresented among the estimated 39,000 chiropractors in active practice. The ABCA also estimates that one of 10 Black chiropractic students in 1988 was a woman. The ABCA does not believe that Black representation, among either students or active practitioners, is either rising or falling, and the disproportion of Blacks practicing chiropractic, especially Black women, is not expected to change significantly.

From information from ACA surveys, the proportion of chiropractors who are female can be roughly estimated. Table XV-A-3 shows these estimates, with the percentage of females doubling during the decade beginning in 1978.

About two-thirds of responding chiropractors (69 percent) were in solo practice in 1988 in contrast to 88 percent in 1962. The proportion of chiropractors in group practice was 27 percent in 1988, compared to only 10 percent in 1962. The trend in practice structure as shown by the survey data--a reduction in solo practice in favor of group/partnership arrangements--is consistent with the practice urbanization trend that has taken place during the same time period.

Characteristics of Practice

Chiropractors responding to the 1988 ACA survey, on average, saw 116 patients in the week preceding the survey, of whom 6.6 were patients on their first visit. These figures are representative of those found throughout the 1980s. About 58 percent of the patients were women. Pediatric and geriatric cases are not a significant portion of the average practice, and ACA data indicates that the annual number of pediatric and geriatric cases seen has each declined by about 25 percent since 1977 (figure XV-1).

In 1988, about three-fourths of chiropractic revenue was derived from two sources - private insurance (48.5 percent), up from 31 percent in 1980, and direct payments by patients (28.4 percent), down from 50 percent in 1980. During this period, income from Worker's Compensation has increased nearly 4 percent while that from Medicare/Medicaid has shown no consistent variation from the approximately 7 percent reported in 1988.

From 1980 to 1987 (the last complete year for which such ACA data are available) median annual gross income in then current dollars increased 94 percent, from $75,250 to $146,065 while average annual gross income increased 90 percent, from $91,342 to $173,373. During this same period median net income increased 62 percent to $63,889 and average net income increased 82 percent to $80,575.

Annual Number of Pediatric and Geriatric Cases Seen by Chiropractors

Age Group	Survey Year, Percent of Cases		
	1977	1982	1988
16 Years and Younger	9.0	5.4	8.2
17 to 64 Years	74.0	80.0	79.5
65 Years and Older	17.0	14.6	13.3

Figure XV-1

Projections of Future Supply

The number of chiropractors is expected to increase substantially in coming years. Projections of enrollees and graduates of chiropractic schools are critical for estimating overall supply in the profession. Based on information provided by the CCE it is not anticipated that additional schools of chiropractic will come into existence within the next five years, nor is it expected that any of the current schools will cease operations. These projections assume that there will be a consistent annual net separation rate of 3 percent from the active pool due to retirements, deaths, and other causes.

Projections also assume that the level of annual graduates (2,500), based upon current enrollment in the 17 chiropractic schools during academic year 1988-89, will continue through the projection period. Current data suggest that the number of applicants exceeds the number of first-year positions and that this will continue in the near future. It is further assumed that the total enrollment observed in the 1988-89 academic year (10,000) will also continue.

The total number of new graduates added to the work force between 1988 and 2000 will be approximately 30,000, accounting for 57 percent of all active chiropractors. Between the years 2001 and 2020 an additional 50,000 graduates are projected. The supply of active chiropractors is therefore expected to increase by 35 percent between 1988 and 2000, from 39,000 to 52,500. By the year 2020 the number of active chiropractors is projected to be 66,600, an increase of an additional 27 percent over the year 2000. The ratio of active chiropractors to population is expected to increase from 15.8 per 100,000 in 1988 to 19.6 in the year 2000 and to 22.6 per 100,000 in the year 2020 (Table XV-A-4).

Alternatively, it is possible that enrollment declines that occurred in the early part of this decade could recur reducing the number of graduates by 20 percent to about 2,000 annually. In that case, the number of active chiropractors would rise to 49,700 in the year 2000, and to 57,400 by the year 2020. The ratio of active chiropractors per 100,000 population would still increase under this assumption, from 15.8 in 1988 to 18.5 in the year 2000 and to 19.5 in year 2020.

It appears equally possible, however, that enrollments and graduates could increase significantly in the coming decade. Both additional educational capacity and opportunities for establishment of new practices appear to exist. This would raise the supply of active chiropractors above the levels projected in the basic estimate. No matter what, the active supply of chiropractors is expected to rise sharply in the coming years.

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Table XV-A-1. Colleges of Chiropractic in the United States: Location, Accreditation, and Graduates, 1981 and 1988

Chiropractic College	Location	Accredited By	Number of Graduates 1981	Number of Graduates 1988
Cleveland Chiro Coll	Kansas City, MO	CCE	65	117
Cleveland Chiro Coll	Los Angeles, CA	CCE	109	118
Life Chiro Coll	Marietta, GA	CCE	384	296
Life Chiro Coll-West	San Lorenzo, CA	CCE	1/	129
Logan Coll of Chiro	Chesterfield, MO	CCE	185	175
Los Angeles Coll of Chiro	Whittier, CA	CCE	176	299
National Coll of Chiro	Lombard, IL	CCE	230	172
New York Chiro Coll	Glen Head, NY	CCE	229	195
Northwestern Coll of Chiro	Bloomington, MN	CCE	108	140
Palmer Coll of Chiro	Davenport, IA	CCE	530	532
Palmer Coll of Chiro-West	Sunnyvale, CA	CCE	93	148
Parker Coll of Chiro	Irving, TX	CCE 2/	3/	90
Pennsylvania Coll of Straight Chiro	Levitttown, PA	SCASA	1/	34
Sherman Coll of Straight Chiro	Spartanburg, PA	SCASA	136	78
Southern California Coll of Chiro	Pico Rivera, CA	SCASA 4/	45	76
Texas Chiro Coll	Pasadena, TX	CCE	67	81
Western States Chiro Coll	Portland, OR	CCE	169	117

1/ Data Not Available
2/ Recognized Candidate for Accrediatatation
3/ New School; No graduation in 1981
4/ Accredited by CCE prior to 1988 as Pasadena College of Chiropractic

Table XV-A-2. Estimated Numbers and Ratios of Active Chiropractors-to-Population: United States, 1978-1988

Year	Number of Active Chiropractors	Total Population (1,000s)	Active Chiropractors per 100,000 Population
1978	23,400	223,880	10.5
1980	25,600	228,542	11.2
1982	28,300	233,217	12.1
1984	31,500	237,677	13.3
1986	35,000	242,308	14.4
1988	39,000	246,400	15.8

Source: Estimates derived from data of American Chiropractic Association by Bureau of Health Professions, Division of Associated and Dental Health Professions. Population estimates derived from Bureau of the Census, Series P-25, Number 1028.

Table XV-A-3. Number of Active Chiropractors, by Sex: United States, 1978-1988

Year	Number of Active Chiropractors	Male Chiropractors	Female Chiropractors	Percent Female of all Chiropractors
1978	23,400	22,200	1,200	5.0
1980	25,600	24,300	1,300	5.0
1982	28,300	26,300	2,000	7.1
1984	31,500	28,900	2,600	8.4
1986	35,000	31,600	3,400	9.8
1988	39,000	35,100	3,900	10.0

Source: Estimates derived from data of American Chiropractic Association by Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table XV-A-4. Estimated and Projected Number of Active Chiropractors and Chiropractor-to Population Ratios: 1980-2020

Year	All active Chiropractors[1]	Total population (thousands)	Active chiropractors per 100,000 total population[2]
1980	25,600	206,466	12.4
1984	31,500	228,976	13.8
1988	39,000	247,284	15.8
1990	41,500	250,410	16.6
2000	52,500	268,266	19.6
2010	60,600	282,575	21.4
2020	66,600	294,364	22.6

1/ Projected assumes 2500 graduates per year from 1988 on.

2/ Ratios are based on total population, including Armed Forces overseas.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Chapter XVI

PHYSICIAN ASSISTANTS

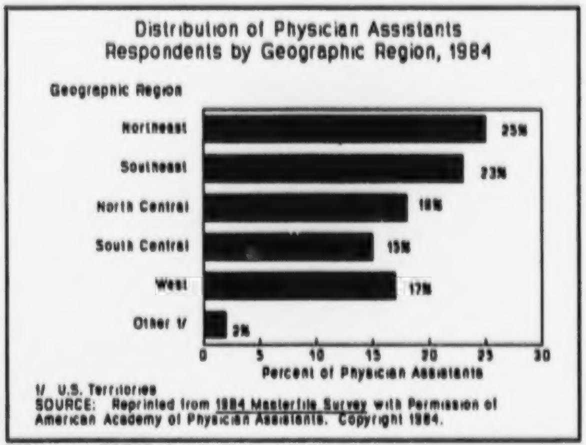
Introduction

Although the perception of the adequacy of the future supply of physicians has changed from shortage to surplus to balance, the demand for PA services remains high. It appears that physician assistants (PAs) are now part of the mainstream of medical care delivery.

Practice Characteristics of Physician Assistants

Geographic Distribution

PAs perform medical services under physician supervision in 49 states and the District of Columbia. New Jersey is the only state limiting PA practice to Federal facilities. PA distribution generally parallels that of the U.S. population. New York has the largest number (2,897) in all categories including students and those not providing patient care, followed by California (2,733), Pennsylvania (1,366), Texas (1,136), and North Carolina (1,126) AAPA, 1988b). In 1984 just under one-half of PAs were located in the Eastern U.S., with 25 percent practicing in the Northeast and 23.4 percent practicing in the Southeast. There was very little change in the distribution of PAs between 1982 and 1984, except for a 3.4 percent loss in the Northcentral region (figure XVI-1) (AAPA, 1985).


Distribution of Physician Assistants Respondents by Geographic Region, 1984

1/ U.S. Territories
SOURCE: Reprinted from 1984 Masterfile Survey with Permission of American Academy of Physician Assistants. Copyright 1984.

Figure XVI-1

Medical Specialty

Although PAs work mostly in primary care specialities, they are found in all medical specialties and subspecialties. Over the past four years an increasing percentage of new graduates have entered nonprimary care specialties (41 percent in 1985 to 48 percent in 1988). Over three-fourths (81.5 percent) of 1988 graduates were employed in one of three specialty areas: family medicine (34.3 percent), surgery (24.5 percent, including subspecialties) and internal medicine (22.7 percent, including subspecialties). In internal medicine subspecialties, cardiology, hematology, and oncology were selected by the largest. Of ten surgical subspecialties, cardiovascular surgery was selected most often (Oliver et al, 1989).[1] The number of PAs practicing in family medicine remained stable between 1985 and 1987 and then declined by 3 percent in 1988. However, PAs are still more than twice as likely to be in family practice than are physicians (table XVI-A-1) (DHHS, 1988c; Oliver et al, 1984).

Employment Settings

PAs are employed in increasing numbers in all medical and surgical disciplines in hospitals ranging from small community hospitals to large academic medical centers. Teaching hospitals that have reduced the size of residency programs employ increasing numbers of PAs as housestaff (DHHS, 1988c). Utilization of PAs has permitted hospitals to maintain the required levels of patient services in a cost-effective manner (Cawley, 1987). More than one-third of 8,673 PAs (including 703 surgeons assistants) surveyed in 1988 were employed in hospital settings compared to 14 percent in 1976 (AAPA, 1988b). Recent employment trends for newly graduated PAs indicate that this number may increase. However, anecdotal information obtained from PA program directors shows that many of these graduates are attracted to private practice after completing four or five years in a hospital setting (Oliver, 1988).

Medicare and Medicaid policies governing coverage for PA services in hospitals and other institutional settings encourage their hiring. PA services are commonly included in total operating costs, which are usually reimbursed by third party payors (U.S. Congress, 1986). Medicare Part B reimbursement policies for PAs were broadened through passage of Public Law 99-509 that authorizes payment to the employer on a discounted fee basis for services of PAs working under the supervision of physicians in hospitals, skilled nursing, and intermediate care facilities and as assistants during surgery. Medicare Part B coverage was also expanded to include all physician services provided by a PA in a rural health manpower shortage area regardless of practice setting (AAPA, 1988a).

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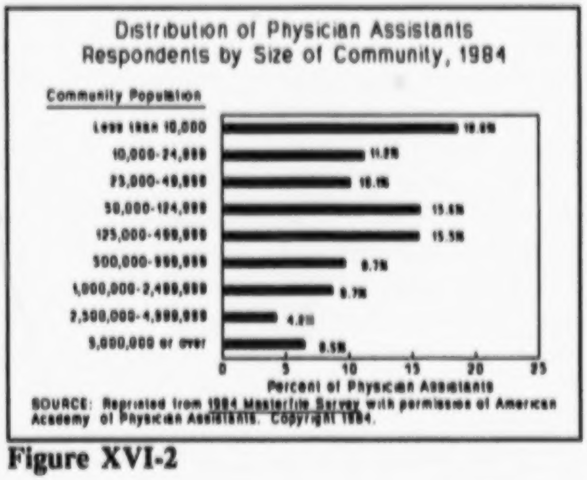
[1] Fifty-seven percent of graduates who chose a surgical subspecialty selected cardiovascular surgery.

PAs are caring for underserved populations in rural areas, inner-city neighborhoods, substance abuse clinics, prison systems and long term care facilities. A number of studies have shown that PAs locate in nonaffluent, medically underserved areas with high percentages of nonwhite populations (U.S. Congress, 1986). In 1984, about 30 percent of PAs were working in a rural or small town setting (fewer than 25,000 people) (AAPA, 1985).


Distribution of Physician Assistants Respondents by Size of Community, 1984

SOURCE: Reprinted from 1984 Masterfile Survey with permission of American Academy of Physician Assistants. Copyright 1984.

Figure XVI-2

Although the PA:population ratio in rural States is still high, recent data indicate that a growing number of PAs are practicing in urban shortage areas (Weston, 1984). Attractive salaries and employee benefit packages provided by employers in urban/suburban settings have drawn PAs to those areas. PA students are younger and more likely to be female than in earlier years and may be less likely to settle in rural areas. Although to a much lesser degree than their female physician counterparts, (64 percent versus 90 percent), most female PAs prefer to practice in urban settings (Oliver, et al, 1984). However, this practice pattern may be related to the distribution of physicians since PAs are dependent practitioners (figure XVI-2).

As addressed in the Sixth Report, PA suitability for expanded practice, such as intermediate and home health care for the elderly, has been demonstrated (DHHS, 1988c). There has been a demand for PA employment in all settings that provide care to HIV-infected persons (AAPA, 1988c). PAs are actively involved in the treatment of HIV-infected persons at all levels, from ordering tests to counseling patients. Often, they are on the front lines in the primary care of AIDS patients (DHHS, 1987).

In 1984 it was reported that minority PAs were more likely than White PAs to work in public institutions and clinics and in primary care specialties. Minority PAs saw a greater percentage of patients who were nonwhite and from low-income families (DHHS, 1988c)(Carter et al, 1984). Current data are needed to determine whether there has been a change in practice distribution for minority PAs.

Developments In Demand

Current reports show that there is a substantial and continuing increase in demand for PA services. This demand exceeds the supply of graduates, currently under 1,200 annually. PA programs reported an average of 5.7 jobs per graduate in the spring of 1988. The ratio of employment opportunities to graduates was highest in the Northeastern region (6.8:1) and lowest in the Southeastern region (4.0:1). Information from individual PAs and PA programs indicates that the current shortage is a recent development (Oliver et al, 1989). A comparison of the employment status of students graduating between 1985 and 1988, shows that employment opportunities for graduates have increased each year since 1985. For example, in 1988, 91 percent of new graduates were employed as PAs within 13 weeks after graduation as compared to 79 percent of 1985 graduates (Oliver et al, 1989).

The demand for PAs is more acute in some regions than others. Of the 500 vacancies nationwide reported in April 1988 by a national PA job placement service, the majority were found in the Northeast with hospitals as the primary setting. Middle/South Atlantic States followed with private group practice experiencing the greatest demand (AAPA, 1988c). Demand for PAs is particularly high in New York State (NYS) and is projected to increase. A principle contributing factor is the need to fill medical personnel gaps in hospitals resulting from NYS regulations that have reduced the numbers of hours a medical resident may work (AMN, 1989).

Other reasons stated in a recent report issued by the New York State Labor-Health Industry Task Force on Health Personnel include aging of the NYS population, the AIDS epidemic, and increases in numbers of disabled and chronically ill who have improved survival rates (NYS, 1988). New York City hospitals are beginning to subsidize the training of PAs in return for service in that hospital upon graduation.

PA shortages also exist in less populated states. A recent state-wide hospital survey in Maine showed that the vacancy rate was over 20 percent, up dramatically from the previous year and higher than the rate for any other group of health care workers. The shortage is particularly acute for rural hospitals. A private foundation in Utah is also supporting PA training for five students each year through 1991 in exchange for service in underserved, rural areas (USAPA, 1988).

PA employment opportunities listed at the Sixteenth Annual PA Conference in 1988, indicated that demand for PAs in hospitals was slightly higher than private office settings, as shown in table XVI-1.

The demand for PAs in Federally-supported/operated health programs is also increasing, with a critical shortage reported in the Federal Bureau of Prisons (BOP). The BOP, which reported 150 vacancies in January 1989, is engaged in an aggressive recruitment campaign (USDJ, 1989). The U.S. Public Health Service (PHS) began commissioning PAs in January

1989. PAs have also recently been included in the National Health Service Corps Loan Repayment Program in return for service to the BOP. These dual actions of the PHS may help alleviate the PA manpower shortages in Federal prisons.

There are 869 PAs working in Department of Veterans Affairs facilities, 150 more than two years, a number projected to rise (DVA, 1989). The DVA has asked the Institute of Medicine to study their physician manpower needs, including PAs. In 1988, the Indian Health Service (IHS) included PAs in their grouping of priority professions eligible for consideration under their scholarship program.

Table XVI-1

PA Employment Opportunities by Setting[1/]

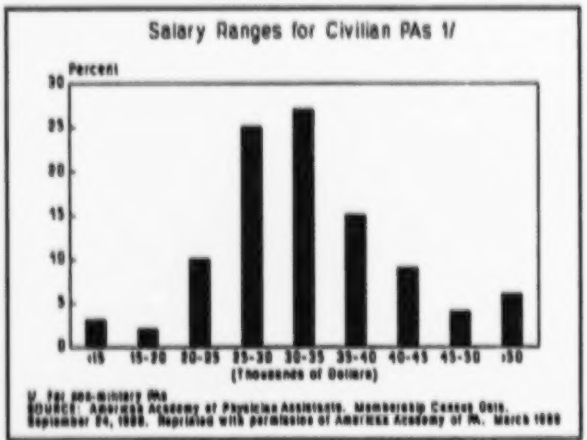
Setting	Percent
Hospital	32.3
Office	31.0
HMO	12.3
Clinic	6.6
Health Center	6.4
Rural Clinic	3.7
Inpatient	2.7
Correctional	2.1
Other	2.9
Total	100.0

1/ Number = 500

SOURCE: "PA Job Find," AAPA Convention Issue, Arlington, VA, April 1988.

Salaries

Salaries for PAs have taken an upward turn figure XVI-3. In 1987 the reported average starting salary for new graduates was approximately $26,500 per year. The average salaries for PAs across all regions, specialties and years of practice were approximately $33,000 in 1988 (AAPA, 1988b). This compares to $25,500 in 1984 and $22,200 in 1980 (AAPA, 1985) (APAP, 1982). Earnings depend upon region of the country, years of practice, and medical specialty. However, the American Academy of Physician Assistants (AAPA) reports that employers, in order to attract and retain PAs, are rapidly increasing pay and benefits.



1/ For non-military PAs
SOURCE: American Academy of Physician Assistants. Membership Census Data, September 24, 1988. Reprinted with permission of American Academy of PA. March 1989

Figure XVI-3

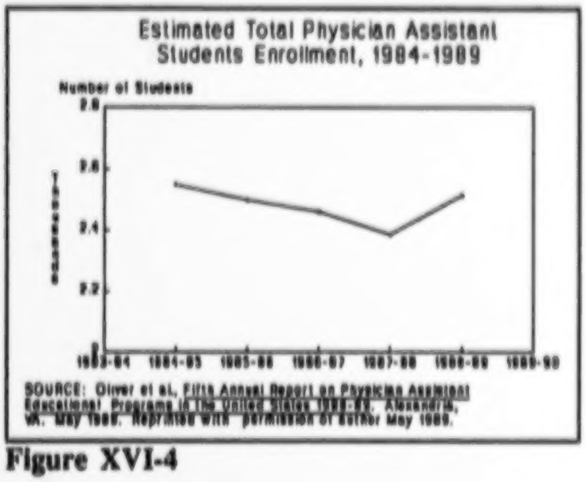
Developments in PA Educational Programs

As of March 1989 there were 51 PA programs accredited by the American Medical Association's Committee on Allied Health Education and Accreditation, the same as in the past 3 years. Included are a U.S. Army-sponsored program and three surgeons assistants programs. Four new civilian PA programs may begin during the next two years and the U.S. Air Force and the U.S. Navy are reinstating their training programs as the PAs retire. There has not been this degree of interest in starting new PA programs since the early 1970s.

The U.S. Navy will be increasing the numbers of PAs over the next five years offering them full commissions, expanding specialty opportunities, and deploying them with the Fleet and Marine Corps. The U.S. Army is now the only branch of the Armed Services that does not commission PAs. There are currently 1,300 active duty PAs serving in the military, an increase of 100 since 1987 (DHHS, 1988c; Finerfrock, 1989).

Enrollment Characteristics

The Fifth Annual Report on Physician Assistant Educational Programs in the U. S., 1988-1989 estimated that the total number of students enrolled in all PA and surgeons assistant programs was 2,514. The following graph, shows that the decline in enrollment since 1984 has been reversed (figure XVI-4).



SOURCE: Oliver et al, Fifth Annual Report on Physician Assistant Educational Programs in the United States 1988-89. Alexandria, VA. May 1989. Reprinted with permission of author May 1989.

Figure XVI-4

In spite of enrollment gains 16.3 percent of the maximum capacity of PA programs remained unfilled in academic year 1988-89, partly due to the declining applicant pool and partly due to student attrition. In academic year 1988-89 the ratio of applicants to students admitted was 3.3:1, down from 4 applicants for every student enrolled in 1984 (Oliver et al, 1988). However, this ratio changed only slightly from the previous reporting year (3.4:1), which may mean that the decline in applicants is beginning to stabilize.

Although PA programs enroll as many as 55 first-year students per year, the average size of the entering class in 1988 was 25.9 students. Of these students 62 percent were women (Oliver et al, 1989). The percentage of women enrolled has increased steadily since the first PA program began in 1965 and the first all male class matriculated.

Typically, PA programs enroll older students with previous health care experience in a related field. Almost one-half of students enrolled in the first-year class in academic year 1988-89 were age 27 or older. The amount of previous health care experience for entering students has increased steadily over the past 5 years (from 31.7 months in 1983 to 44.9 percent in 1988). However, in recent years some PA programs, particularly on the East Coast, began enrolling younger and/or less experienced students necessitating modifications in training. Special programs to assist students with analytical reasoning and counseling and tutorials for academically borderline students are on the increase in these programs (DHHS, 1989a).

Enrollment of Underrepresented Minorities

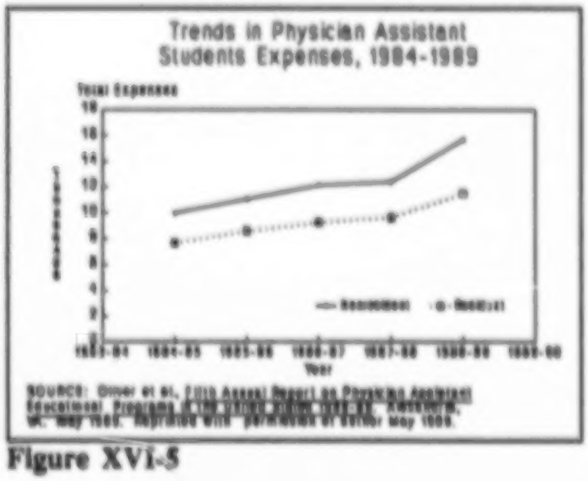
Although the number of practicing minority PAs (Blacks, Hispanics and Native Americans) declined from 1976 to 1984, with reductions mostly among Blacks, there has been an increase in enrollment since academic year 1983-84. Minority students enrolled in the first-year class increased from 13.8 percent in 1983-84 to 20.4 percent in academic year 1988-89, and the majority of these are Black (table XVI-A-2) (Oliver et al, 1989). However, most of minority enrollment is concentrated in one-fourth of the programs. Eleven of the 37 programs receiving PA training grant support in Fiscal Year (FY) 1989 had underrepresented minority enrollment more than 19.8 percent, comparable to the percentage of underrepresented minorities in the general population (DHHS, 1989a). Twelve programs responding to the 1988 Association of PA Programs (APAP) program survey had no minority enrollment.

The overall rate of attrition for all racial categories was 14.0 percent (3.4 students per program) in 1988-89, a rate higher than the previous four-year average of 11.4 percent. However, the attrition rate increased dramatically from that reported in academic year 1987-88 for Black students (17.4 percent) to 29.1 percent in 1988-89. The attrition rate for Black males (42.1 percent) reached the highest level reported since 1984. The attrition rate for Hispanics (10.4 percent) in the 1988-89 academic year was lower than for White (12.3 percent) (Oliver et al, 1989) (tables XVI-A-3 and XVI-A-4). Except for the 1986-87 academic year, when attrition for Hispanics was disproportionately high, they have had the smallest attrition rate of all racial groups since 1984-85. Programs on the East Coast graduated larger numbers of minority PAs in 1988, but programs on the West Coast graduated a larger percentage of minorities in proportion to total enrollment. (Oliver et al, 1987 and 1989).

Steps are being taken to overcome such deterrants to minority students as: inadequate role models, deficiencies in educational preparation and counseling, and insufficient financial aid (Schafft and Cawley, 1987). One activity is Project Access, begun in 1986, a collaborative effort between the AAPA and APAP to visit schools in minority communities to explain the PA profession and encourage students to develop the necessary skills to qualify for acceptance into PA educational programs (Schafft and Cawley, 1987). However, there is a critical need for minority faculty with the necessary pedagogical skills to teach and serve as role models. There are few faculty development opportunities available to PA faculty, minority or otherwise (DHHS, 1989a).

Student Expenses

In academic year 1988-89 resident students spent an average of $5,742 per year for tuition, books, fees, and equipment compared to $7,828 for nonresident students (figure XVI-5). In that year the total expenses incurred by the typical PA student for an entire PA education (including tuition, books, equipment, and fees) averaged $11,485 for residents and $15,681 for nonresidents, about 50 percent higher than in 1983. Nearly two-thirds of the students received financial aid in academic year 1988-89; this did not change substantially between 1983 and 1988 (Oliver et al, 1988). The degree of student indebtedness may influence the jobs graduates will accept, i.e., graduates may take jobs in higher paying specialties such as surgery rather than in primary care specialties.



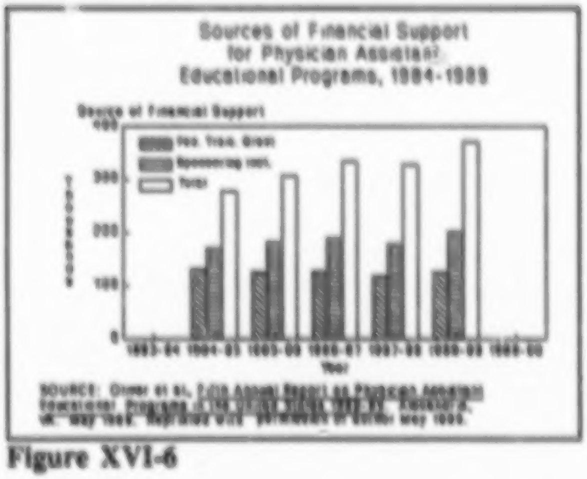
SOURCE: Oliver et al, [illegible] Annual Report on Physician Assistant Educational Programs [illegible]

Figure XVI-5

Programs' Financial Characteristics

The total annual financial support from all sources, for 44 responding programs in 1988 averaged $371,386 per program (Oliver et al, 1989).

Federal support continues to be an important source of funding for PA educational programs. Thirty-seven grants were awarded in FY 1988 for an average of $125,000 per grant (DHHS, 1989a) (figure XVI-6). Funding for PA training grants sponsored by the Health Resources and Services Administration, Bureau of Health Professions not only subsidizes PA education, but also assists in training students in and deploying graduates to medically underserved areas. Additional funds support expensive remote site training such as that in the Alaskan Bush. They also help support development and expansion of curricula to respond to national priorities such as quality assurance, geriatrics, AIDS, and encourage recruitment and graduation of underrepresented minorities into the PA profession.



SOURCE: [illegible]

Figure XVI-6

Educational Developments

Generally, PA programs require a minimum two years of college prior to admission. In academic year 1987-88, 49 percent of PA students had a baccalaureate degree or higher prior to admission and another 17.2 percent had an associate degree (Oliver et al, 1988). The academic background of PA students has remained essentially the same since 1983-84.

Broadly-based primary care training continues to be the educational philosophy for PA training programs. Graduates then have the versatility to choose positions both in primary and nonprimary care settings (Perry and Breitner, 1982). Although there are variations in duration, most PA programs are two years in length, with a curriculum that includes basic and behavioral medical science, an introduction to clinical medicine, and one year of supervised clinical experience. Increasing numbers of programs are offering training leading to a master's degree. In 1988 four PA programs offered a master's degree or master's option, as will five other programs by the end of 1989 (Oliver et al, 1988). Soon master's level students will become eligible for Health Education Assistance Loans. Surgeon assistant programs are structurally similar except that they place greater emphasis on clinical and technical skills related to surgical patient care.

Postgraduate programs now provide advanced educational experiences for PAs in medical and surgical disciplines. Often termed "PA residencies," they offer additional clinical and structured learning experiences in specialty areas to graduate PAs. The number of these programs has changed little since 1984. In September 1988, there were 10 such "residencies," an increase of one since 1987. (DHHS, 1988b).

Between 1984 and 1987 the coursework area having the greatest expansion was behavioral science (Oliver et al, 1988). In academic year 1988-89 the greatest number of changes in the first-year curriculum were reported in the introductory clinical sciences. Modification of program curricula is often a consequence of the emergence of new roles, e.g., new information in areas such as geriatrics, home health care, alcohol and substance abuse, and prevention and treatment of AIDS victims. Legislation in Fiscal Year 1986 directed all PA programs funded under Section 783 (now Section 788(d)) of the PHS Act to incorporate health promotion, disease prevention, geriatrics, and home health care into curricula. As in prior years, the supervised clinical experience portion of the curriculum for PA programs in academic year 1988-89 averaged 52 weeks in length, with 34 weeks of primary care and 18 weeks of nonprimary care medicine (Oliver et al, 1989; DHHS, 1988c).

Before 1980 there were few curricular offerings in geriatrics. Since that time both geriatric and/or gerontologic offerings within PA programs have increased steadily, partly as a result of Federal initiatives. A BHPr contract completed in 1989 also sponsored development of a model didactic curriculum module in home health care and provided an on-site program of technical assistance to 14 PA educational programs. This didactic module was made available to all PA programs in 1989 (DHHS, 1989b).

Substance abuse components of curricula in PA training programs have been increasing steadily over the past 10 years. They include both didactic and clinical experiences. The strong emphasis on behavioral sciences in PA training and the importance placed on interpersonal and psychosocial skills serve as foundation for training in these areas (DHHS, 1988a).

Since 1986 there has been a dramatic increase in the numbers of programs incorporating curricula for the prevention and treatment of HIV-infection. In 1989, 33 (89 percent) programs receiving Federal PA training grant support included didactic and/or clinical activities about the physical and psychosocial aspects of caring for both persons with AIDS and their families and friends (DHHS,1988b).

A Look at the Future

Supply Projections

The AAPA estimates the total current PA population to be about 20,000. Approximately 80 percent work predominantly in clinical settings providing patient care. PAs associated with educational programs who work part-time in a clinical capacity are not included in these estimates. The AAPA reported that as of January 1989, there were 19,648 graduates of accredited PA training programs and of these, 17,392 were certified by the National Commission on Certification of PAs (NCCPA)(AAPA, 1989). These numbers do not include informally trained PAs such as nurse practitioners and others who have sat for the NCCPA examination (AAPA, 1988b).

For the past several years training programs have graduated approximately 1,200 PAs each year. New or reinstituted programs may add another 200 graduates each year by 1992. With the renewed interest in PA programs this number could increase even further. Assuming that 95 percent of graduates continue to enter practice, as shown by recent experience, and that an additional 10 programs will start or be reinstituted by academic year 1991-92, and that 20 percent of PAs will leave the work force (because of death, retirement, or other attrition), the number of clinically active PAs in the year 2020 is estimated to be 54,000.

These projections exceed those presented in the Sixth Report because prior forecasts expected that the numbers of PA programs would remain relatively constant (DHHS,1988c). The revised projections are very close to those developed by the AAPA in 1986, which estimated that the total number of active PAs in the year 2020 would be 55,320 (May, 1987). Specific data on the age of PAs in practice, number in the military who are retiring after 20 years, and factors that may affect enrollment and retention levels are needed to improve accuracy of supply projections.

Factors Affecting Requirements

The demand for PAs in all settings in both the Federal and private sectors is expected to continue to increase. Among the forces driving that demand are the removal of barriers to third party reimbursement and local practice. The laws and regulations in many States that constrain PA practice are being amended. The Council on Graduate Medical Education reported that there continues to be a maldistribution of medical services (DHHS, 1988a).

The physician shortage in both rural and urban underserved areas is expected to encourage continued use of PAs and other physician extenders. PA utilization in rural areas will be further encouraged by the expansion of Medicare Part B coverage to include all physician services provided by PAs in a rural health manpower shortage area regardless of practice setting. Barriers to practice in nursing homes have been removed, which will make PAs even more attractive to those employers. As of February 1989 changes in the Medicare legislation have fully incorporated PAs into the health care team. Revised Medicare regulations require that a physician conduct the initial patient visit, but subsequent visits can be alternated between visits by the physician and visits by a PA or a nurse practitioner.

There has also been an overall effort by States to expand the utilization of PAs, including amendments of many State laws and regulations that provide for uniformity in education and practice requirements and allow for PA participation in their own regulation. Other changes include broadening of prescriptive practice regulations and liberalization of off-site supervision requirements. The goal is to improve PA practice to medically underserved populations, particularly in the rural areas (Gara, 1989).

Finally, the PA profession now enjoys an improved reputation and credibility through expanded recognition of the quality care they provide. Factors that have affected this improved image are the educational standardization of PA training programs and a stringent certification and recertification process.

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Table XVI-A-1. DISTRIBUTION OF PHYSICIAN ASSISTANTS BY SPECIALTY 1984-88[1]

Specialty	1984 Percent	1985 Percent	1986 Percent	1987 Percent	1988 Percent
Primary Care Specialties	63.9	62.5	60.8	59.9	55.0
Family Medicine[2]	40.2	37.5	37.3	37.8	35.0
General Internal Medicine	15.2	15.5	13.5	14.3	12.9
Pediatrics	5.0	5.4	5.8	3.6	2.8
Obstetrics/Gynecology	3.5	4.1	4.2	4.2	4.3
Non Primary Care Specialties	36.1	37.5	39.2	40.1	45.0
Surgical Subspecialties	11.6	11.8	11.5	11.1	11.2
General Surgery	7.4	8.2	7.7	9.4	8.3
Internal Medicine Subspecialties	5.0	8.2	5.4	5.0	4.6
Psychiatry	1.6	1.5	1.3	1.5	1.5
Emergency Medicine	[3]	4.1	4.3	4.8	5.1
Industrial Medicine	[3]	1.5	1.9	1.8	1.9
Other Specialties[4]	10.5	2.2	7.1	6.5	12.4
Total	100.0	100.0	100.0	100.0	100.4

1/ Total population of graduates.
2/ Includes geriatrics medicine.
3/ Information not available.
4/ Includes orthopedics (2.9 percent), Correctional Medicine (2.1 percent), Pediatric Subspecialties (0.6 percent) and Neurology (0.5 percent).

SOURCE: Adapted from Fifth Annual Report on Physician Assistant Education Programs in the United States 1988-89. Alexandria, VA. May 1989.

Table XVI-A-2. TRENDS IN THE ETHNIC REPRESENTATION OF PHYSICIAN ASSISTANT STUDENTS ENROLLED IN PHYSICIAN ASSISTANT PROGRAMS FROM 1983 THROUGH 1988

	Academic Year									
	1983-1984		1984-1985		1985-1986		1986-1987		1988-1989	
Ethnicity	Mean[1]	Percent	Mean	Percent	Mean	Percent	Mean	Percent	Mean	Percent
White	20.7	86.2	20.3	83.4	20.9	85.3	19.6	78.8	20.8	79.7
Nonwhite	4.0	13.8	4.1	16.6	3.6	14.7	5.3	21.1	5.3	20.3
Total (N)[2]	24.0 (39)	100.0	24.5 (39)	100.0	24.6 (41)	100.0	24.9 (47)	100.0	25.9 (46)	100.0

1/ Mean number of students enrolled per program.
2/ Number of programs responding.

SOURCE: Oliver et al, Fifth Annual Report on Physician Assistant Education Programs in the United States 1988-89. Alexandria, VA. May 1989.

Table XVI-A-3. Number and Attrition Rates of the 1987 Graduating Class by Ethnicity

Ethnicity	Number Graduated			Number Withdrawing Prior to Graduation		Attrition Rate**
	Number	Mean	Percent	Mean	Percent	Percent
Black/NonHispanic	45	1.9	8.5	0.4	13.8	17.4
Hispanic	45	1.0	4.2	0.9	3.3	8.3
White NonHispanic	45	18.7	82.8	2.1	10.1	10.1
Other	45	1.0	4.5	0.2	7.2	16.7
Total	45	22.6	100.0	2.7	100.0	10.7

SOURCES: Oliver et al. Fourth Annual Report on Physician Assistants [illegible]cational Programs in the United States 1987-88. Alexandria, VA, April 1988.

Table XVI-A-4. Number and Attrition Rates of the 1988 Graduating Class by Ethnicity

	Number Graduated			Number Withdrawing Prior to Graduation		Attrition Rate**
Ethnicity	Number	Mean	Percent	Mean	Percent	Percent
Black/NonHispanic	44	1.7	8.3	0.7	18.4	29.1
Hispanic	44	1.0	4.9	0.11	13.2	10.4
White NonHispanic	44	17.3	84.0	2.4	63.2	12.3
Other	44	0.6	2.9	0.2	5.3	25.7
Total	44	20.7	100.0	3.4	100.0	14.0

*Number of programs responding.

SOURCES: Oliver et al. Fifth Annual Report on Physician Assistants Educational Programs in the United States 1988-89. Alexandria, VA, May 1989.

Table XVI-A-5. Health Resources and Services Administration[1]
Support for Physician Assistant Programs
Fiscal Years 1972-1988

Authority PHS Act	Fiscal Year	Amount Funded	Total Programs
HMEIA Contracts Sec. 774(a)	1972	$6,090,109	40
	1973	6,208,999	39
	1974	8,129,252	43
	1975	5,994,002	40
	1976	6,247,203	41
	Subtotal	$32,669,565	
Sec. 701(8) and Sec. 783(a)(1)	1977	$8,171,441	39
	1978	8,685,074	42
	1979	8,453,666	42
	1980	8,262,968	43
	1981	8,019,000	40
	1982	4,752,000	34
	1983	4,752,000	34
	1984	4,414,850	34
	1985	4,442,076	37
	1986	4,548,000	37
	1987	4,275,000	36
	1988	4,549,973	37
	Subtotal	$ 73,326,048	
	Total Amount Funded	$105,995,613	

1/ Formerly Health Resources Administration
2/ Health Manpower Education Initiatives Awards

SOURCE: U.S. Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions, Division of Medicine Program Files, Rockville, MD., June 1988.

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